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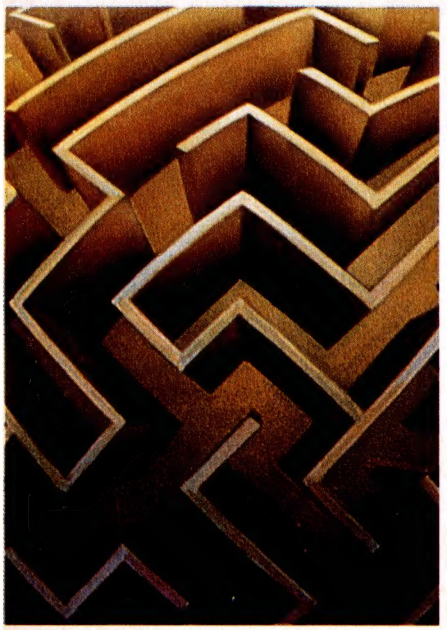

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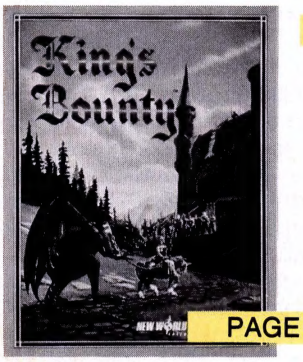
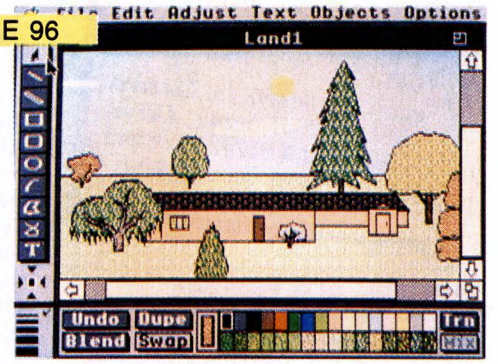


PAGE 11

PAGE 96



DEPARTMENTS

2 LETTERS

5 VIEWPOINT

6 WELCOME TO NEW READERS

9 ASK NIBBLE
Nibble's expert answers the tough questions posed by readers. — *by Roger Wagner*

10 SHAPIRO ON GAMES
If you dream of power, you'll want the armies of King's Bounty at your fingertips. Other exciting battles lie ahead in The Ancient Land of Ys and Firepower. — *by Neil Shapiro*

14 ON THE SCENE
News, views, and the latest hardware and software for your Apple II. Plus Raw Data — updates from the Apple world. — *edited by Arthur S. Luckower*

59 SOFTWARE DIRECTORY

71 TYPING TIPS

77 PRODUCTS & SERVICES INDEX

89 THE ERROR TRAP

91 ONE- AND TWO-LINERS
Nibble's shortest programs! Check out the latest contest winners.

92 NIBBLE MARKETPLACE

96 EDITORS' SPOTLIGHT
The many features of Design Your Own Home — Landscape give you three-dimensional perspectives on your planting plans.

PHOTOGRAPHY BY ERIC FORDHAM

New readers: Please turn to page 6.

COVER FEATURE

18 MEMORY MASTER
Now you have the power to examine your Apple's memory in detail. You can view every byte, modify it, disassemble it, search for phrases, and even move assembly routines! — *by J. Morris Prosser*

FEATURED GAME

26 WHODUNIT
Can you find the murderer? There's only one clue, but lots of suspects. — *by Constance Fairbanks*

REVIEW BOARD

30 SPELLING AND GRAMMAR CHECKERS
These writing aids can simplify your work. We examine four top programs in detail. — *Reviewed by Frank Dooling*

GRAPHICS WORKSHOP

36 SWITCHED ON GRAPHICS
Become a master of Applesoft's plotting and drawing commands, and learn about the soft switches that give you full control. — *by David Harris*

TIPS & TECHNIQUES

40 SMART COLOR FILL
If every corner of the most intricate Hi-Res image isn't getting its full blast of color, use this routine next time to fill in the blanks. — *by Brent Iverson*

50 POKING DYNAMIC DISPLAYS
Animate your text screen by using the memory where each letter is displayed. Your screens will really be popping! — *by George Tylutki*

EXPLORING THE IIGS

55 HEXPAD
Simplify the entering of hex code listings by turning your numeric keypad into a HexPad. — *by Mark A. Heath*

WORKING SMARTER

73 FONT CONVERSION UTILITY
This program converts IIGS system fonts to Publish It! format and back. — *by Rudy Guy*

FEATURED APPLICATION

78 ODOMETER
Find out just how efficient your car is. Odometer will compute your miles per gallon, and average out your other expenses, too. — *by Matt Cox*

LETTERS

Dear Readers:

We'd like to hear from you! Whether you have questions you need answered or you'd just like to share your thoughts on articles and issues, drop us a line.

Send your letters to: Letters, Nibble, 52 Domino Drive, Concord, MA 01742. (Letters may be edited for length.)

OLD DOS, OLD TRICKS?

► I just got a copy of the April 1990 *Nibble*, and felt compelled to write.

I have been an Apple II owner, user and enthusiast since 1982, and have owned and used II Plus, IIe, and IIGS systems both at home and at work. From the beginning, I, like many others, craved good information and publications, and *Nibble* was my overall favorite. Recently, however, there seems to be less and less relevant information in your magazine.

For example, in this issue, two of the feature articles (RAM Disk 3.3 and ProDOS Linker) relate all the way back to DOS 3.3. Please don't misunderstand — I am not condemning references to DOS 3.3 or the publication of articles relating to it. I am saying that this is certainly not anywhere near state-of-the-art, nor are the other articles in this issue.

For the past few years, there have been numerous "doom & gloom" stories circulating about the inevitable death of the Apple II line. I, for one, still believe the machine has a lot to offer. If, however, the publishers of magazines such as yours cannot promote its current (and future) capabilities, its death will most certainly be inevitable. A II Plus running DOS 3.3 simply cannot stand up to the newer MS-DOS and Macintosh systems with megs of memory, windowed environments, faster processors, and so on.

The IIGS has incredible possibilities. With the addition of memory and accelerators, these grow further. There are currently rumors of a 20MHz 65816 CPU being considered. These are the hopes of all real II users. Applied Engineering's PC Transporter allows running MS-DOS on an Apple: this should not be considered as taking a step away from the II, but rather recognition of the fact that the world is demanding more ability to exchange information with other systems, and have more compatibility with them. My dream machine would be an enhanced IIGS running at 20 MHz, with lots of memory and a 386-based Transporter. I'd love to see Unix or some other multiprocessing operating system running on the 65816. Without the dreams to spark interest and development such a machine will never exist. In the old days, Apple II users felt nothing was impossible.

I feel it is the responsibility of publications such as yours to seek out and promote such ideas, spark new interests, and encourage development. Face it, DOS 3.3, like the 128K Macintosh, floppy-based MS-DOS, and radios using vacuum tubes, is history. If the Apple II does survive, it will be through growth — not by clinging to past memories, no matter how fond of them we may be.

James A. Westlake
San Jose, CA

DOS 3.3 may be "history" in some books, but it is still a simple, reliable operating system. As you may know from reading past Viewpoint columns, the entire Nibble accounting and order entry system runs under DOS 3.3 on a Corvus hard disk network.

continued on page 88

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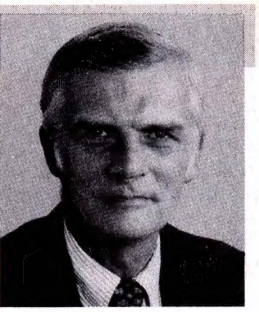


After more than two years of virtual invisibility, the Apple II is coming into sharper focus. This has been stimulated by:

- Wall Street, which hammered Apple Computer's stock earlier in the year for the company's neglect of the low-end personal computer market.
- Numerous letter-writing campaigns by you — concerned Apple II owners who have felt ignored, alienated, and orphaned.
- Sharply declining sales of the Apple II.

The convergence of these market forces set the stage for a series of open and candid communications between Apple Computer and the developer community. Late last year, I joined the board of the newly formed Apple II Developers Association to participate in those meetings with Apple. The other members of the ADA board are:

- Barney Stone, president of Stone Edge Software
- Roger Wagner, president of Roger Wagner Publishing
- Bob Hardman, vice-president of Applied Engineering
- Tom Weishaar, president of A2-Central
- Mark Simonsen, vice-president of Beagle Bros
- Paul Boule, publisher of *InCider*.

The members of the group have one important thing in common: We all make our living in the Apple II market. Over the months, a number of position papers, informal communications, and direct meetings with Apple have sharpened the issues and strategies that are important to the future of Apple Computer and the Apple II.

SOME REALITIES

Apple Computer clearly understands that Apple II owners feel frustrated and neglected. Apple also understands that both developers and consumers have made a massive investment in software for the Apple II. And Apple realizes that it is simply not good business to develop a reputation for orphaning a major customer constituency.

At the same time, Apple has an obvious dilemma. The bulk of new software and applications are being developed for the Macintosh. Furthermore, *if* Apple can develop and introduce a low-cost color Macintosh on a timely schedule, there are undoubtedly large economies of scale in adapting the Macintosh *engine* to serve the low-end market. In everything from production, to parts, to training, to promotion, a single engine is the conceptual ideal.

Unfortunately, we live in a less-than-ideal world.

IBM, Tandy, and the clone manufacturers are attacking Apple's traditional markets with a vengeance. IBM upped the ante in January with a stated intention of bundling the Trackstar 128e card with its PS/2 to provide Apple II compatibility in the education market.

STRATEGIC DILEMMAS

The Apple II's performance has been steadily increasing, largely through the efforts of third-party developers. Applied Engineering's TransWarp III and Zip Technology's Zip Chip boost the Apple II processing performance up to eight times. Apple's most recent announcement is a high-speed SCSI card that improves disk access performance by up to 10 times. It comes with drivers for standard hard disks and Apple's CD-ROM drive; Apple is creating drivers for other SCSI devices, like scanners and tape drives.

Apple II performance improvements haven't been limited to hardware. Roger Wagner's HyperStudio has made significant inroads into the education market. More important, it has proved that hypermedia and the Macintosh user interface can be effectively implemented on an Apple IIGS. And if HyperCard for the Apple IIGS becomes a reality, it could spark a revitalized market interest in the IIGS.

A low-cost Mac faces the difficult challenge of providing a cost-effective alternative to *a system that already exists and gets the job done — the Apple II.*

GETTING THE ACT TOGETHER

In late March, Michael Spindler, Apple's new president, acknowledged in his first major speech that "we have to really get our act together and figure out what we're going to do with the Apple II." Apple Computer is realistically keeping its options open while it tries to mend fences with its Apple II customer base. Here are some realities:

- Two champions of the Apple II have been named within Apple Computer: Jane Lee, Manager of Apple II Product Marketing, and Nancy Stark, Manager of Apple II and Peripheral Marketing.
- Apple *knows* that its reputation in the Apple II market has become tarnished and that Apple II

continued on page 7

WELCOME TO NEW READERS

Welcome to *Nibble* magazine, one of the most interesting and useful publications available for Apple owners. *Nibble* publishes an outstanding collection of valuable Applesoft BASIC and other applications that you can type and run right from the magazine. And every application is supported with an article that shows you, step-by-step, how to put the project into your Apple II and how it works — *even if you know nothing about programming!*

If you're new to computing, however, you may find the world of programs a bit confusing at first. If this is the case, perhaps the best advice would be to spend some time with the manuals that came with your computer. Once you understand how to get Applesoft BASIC up and running, you'll be surprised at how easy it is to enter programs into your Apple. It's always a good idea to start small, with a short BASIC program. Don't forget to review the Typing Tips in this issue as well.

THE BASICS...

Applesoft BASIC is built right into your Apple II. You can type in and run BASIC programs without using your disk drives at all, but if you want to save your programs for later use, you'll need to follow the instructions in your owner's manuals to get BASIC and the disk operating system up and running.

Once you do, you will most likely see a "]" character, called a *prompt*. When you see the prompt, your computer is waiting for you to tell it what to do next. You can:

- Type commands from the disk operating system (e.g., CATALOG)
- Type commands in BASIC (e.g., PRINT 36*42)
- Type in a BASIC program line (e.g., 10 INPUT NAME$,ADRS$)

All BASIC programs consist of a sequence of numbered program lines. The program lines consist of a line number followed by one or more BASIC statements separated by colons. For example,

```
20 FOR I = 1 TO 5: PRINT CHR$(7):
   NEXT I
```

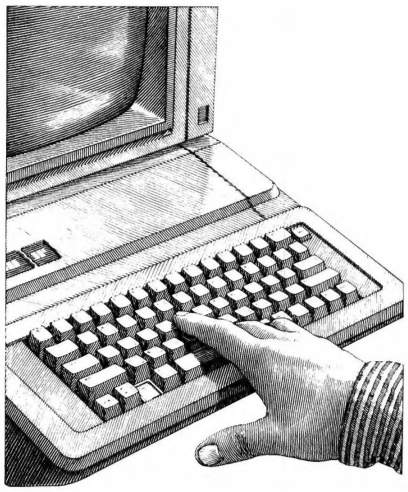
To enter a program, start with the first numbered program line and type it in — including the line number itself — exactly as it appears in the listing. Though a program line may span several printed lines in the listing, do not press Return (the Return key) until you have typed the entire program line. Repeat the process with the next program line, and continue until you have entered them all.

To enter the program in **Listing 1**, follow this sequence:

1. Make sure the Caps Lock key is down.
2. Type NEW and press Return to erase any program lines that may already be in memory.
3. Type **line 10** exactly as it appears, pressing Return after typing the last word in the line ("BELL").
4. Repeat this process for **lines 20-30**
5. Type SAVE RINGER and press Return to save the program on disk under the name RINGER.
6. Type RUN and press Return to start the program. If you entered each line correctly, you should hear a bell ring five times.

LISTING 1

```
10 REM RING THE BELL
20 FOR I = 1 TO 5: PRINT
   CHR$(7): NEXT I
30 END
```



...AND BEYOND

In addition to BASIC, *Nibble* also publishes programs written in *machine language*, the Apple's own internal language. Machine language may at first be intimidating, but you do not need to know all about it in order to use it and harness its power and lightning-quick speed. *Nibble* articles have special instructions for entering and saving machine language programs.

Often, programmers use what is called an *assembler* to translate *assembly language* into machine language. Assembly language is slightly more English-like and readable than machine language, which appears to be nothing more than *hexadecimal* numbers, or *hex codes*. Hex codes are usually two-digit numbers, with the letters *A* through *F* included as digits (e.g., 01, 23, 5F, and EE are all valid hexadecimal numbers).

If you have an assembler, you can type in the assembly language (or *source code*) listings in an article. If you don't have an assembler, you can enter the machine code directly into your computer. Machine language listings have lines that consist of a three- or four-digit hex number followed by a colon and several two-digit hex codes separated by spaces. For example,

```
300:A2 Ø5 2Ø DD FB CA FØ Ø3
```

Listing 2 is a short example of a machine language program in a format that we publish in *Nibble*. The following step-by-step instructions show you how to load it into your Apple and run it.

1. From the "]" screen prompt, type CALL −151 and press Return to switch into the System Monitor. You should now see a screen prompt, "*" (followed by the blinking cursor).
2. At the cursor, type

   ```
   300:A2 Ø5 2Ø DD FB CA FØ Ø3
   ```

   and press Return. Be sure to include the spaces between the pairs of hex characters. You have just entered the first line of the machine language program.
3. At the prompt, type the next line,

   ```
   308:4C Ø2 Ø3 6Ø
   ```

   and press Return. This is the second and last line of the machine language program.
4. Now press the Control and C keys together, followed by Return to go back to the familiar "]" prompt.
5. To save the machine language program as a *binary* disk file, type

   ```
   BSAVE RINGER.BIN,A$300,L$C
   ```

   The A$300 is the hexadecimal address in memory where the program resides. It corresponds to the 300 that you used in the first line of the program. The L$C specifies the length of the program, which contains 12 pairs of hexadecimal characters ($C is the hexadecimal equivalent of 12).

LISTING 2

```
300:A2 Ø5 2Ø DD FB CA FØ Ø3
308:4C Ø2 Ø3 6Ø
```

To run the program, type CALL 768 and press Return. This causes your Apple to begin running the machine language program at memory location 768 (which is the decimal equivalent of $300 hexadecimal). You should hear the bell ring five times each time you type CALL 768.

In this column, we have instructed you to press Return after typing a statement or a command. With the programs in the magazine, however, we do not include the Return instruction. Assume that you need to press Return at the end of each program line.

FIRST AID

To help you avoid typing mistakes, *Nibble* has developed the Checkit system, which alerts you of any typing mistakes you might make. The Typing Tips section explains Checkit and also has information about our Technical Support Department, which is devoted to helping you get your *Nibble* programs up and running.

VIEWPOINT *continued from page 5*

owners are a concerned and articulate group. The company intends to continue selling, supporting, and servicing the Apple II for the foreseeable future. It acknowledges the strategic importance of the Apple II in key markets like education.

- Apple is supporting Apple II sessions at the Worldwide Developer's Conference in May and the A2-Central Developer's Conference in July.
- Apple will become more diligent in including references to the Apple II in its press releases.
- User groups will become an increasingly important part of future Apple II promotional events. Applefest-type conferences will be smaller, but will probably appear with more frequency in different regions of the country under user-group sponsorship. Notable examples are the National Apple User Group Conference recently held in Chicago, and the AZApple Fiesta to be held in Arizona.

STAY TUNED...

It's pretty clear that Apple is going to try like crazy to develop a low-cost color Macintosh (LCM). But it's also apparent that an LCM has a tough hill to climb, and it's unlikely to come soon. An LCM will have one additional challenge. *Apple II software compatibility*. No one will confirm any development effort in this area, but software compatibility is an obvious necessity to make a low-cost Macintosh an effective competitor in the low-end market — particularly in education. If nothing else forces Apple II compatibility, the requirement for meeting technical bid specifications in education proposals will be the stimulus. And this is a requirement that IBM and Tandy can now meet.

It's really a shame that Apple Computer still underestimates the Apple II as a competitive system for a broad spectrum of applications. But there are encouraging signs. The Apple II does have its champions. The issues are no longer being ignored. Apple Computer is showing for the Apple II user community. Future decisions will be conscious, considered decisions influenced by financial and market realities.

The bottom line is that there won't be any cataclysmic changes in the short term. Apple still has to define an effective strategy and product line for the low-end market. And the Apple II is still alive and kicking. Stay tuned...

Mike Harvey

Mike Harvey
Publisher/Editor

Seatbelts Suggested

Buckle your seatbelts for TransWarp III. More than eight times as fast as the IIe's native speed, with upgradeability to more than twelve times as fast! Frankly, we're obsessed with keeping your Apple II going at maximum speed and TransWarp III for the Apple IIe, II+ and II is the latest result.

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Hi-Res screen. Think it's easy to win at first? This is a smart program — the more you play, the better the Apple gets!

■**Pyramid** presents a challenging solitaire card game on the Hi-Res screen. Can you disassemble the pyramid and win? Use the card-drawing routines in your own programs.

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■**The Exterminators** will pursue you until they liquidate you, unless you get to them first. You can trick them into destroying each other, or use your Sonic Screwdriver to destroy nearby Exterminators.

■**Bridges** is a game of clever strategy, with a golden cup as a prize. If you're careful, you can avoid outwitting yourself.

■**Noggin** will boggle your brain and expand your vocabulary. This game challenges you to make words from the letters it shows on the screen.

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■**Nibble Launcher**, a powerful Apple IIGS control center, lets you launch programs easily, without opening numerous windows.

■**Speed Set GS** quickly and easily changes the speed of your Apple IIGS. Put away the Control Panel because this common activity can now be done under control of your own software.

■**Classic Desk Accessories** explores the structure and operation of these utilities. Sandy Mossberg also provides GSInfo, a CDA that keeps you posted on your system's inner workings.

■**File Typer** is a Classic Desk Accessory that will display or print any type of file. Because it's a desk accessory, it's always available when you need it.

■**Memory Peeker Desk Accessory** shows you what's going on inside your Apple IIGS, but you need a way to install it. Sandy Mossberg's utility is the perfect solution.

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■ **ImageWriter Color Control** is an AppleWorks preboot program that lets you select one of seven different ImageWriter II colors for printing your files or spreadsheets. Requires IIc, IIGS or 80-column IIe.

■ **Print Shop Label Maker** produces unique and personalized address labels with Print Shop and Beagle Bros Minipix graphic images. You pick where to print the graphics, and you can print up to three labels on each line. Does not support the IIGS printer port.

■ **Write Correspondence** is a collection of AppleWriter WPL programs that turns AppleWriter into an automated address filer and letter writer. Just select the address and it is automatically inserted into your letter and saved for printing the envelope. Throw out the Rolodex!

Order No. **U07** Clip Art & Friends . . . **$22.95**

PRODOS LIBRARY 2

Get a grip on your ProDOS files!

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■ **ProDOS-DOS 3.3 Doubleboot** lets you boot ProDOS or DOS 3.3 from a single disk. You can choose the system each time you boot up, or have Doubleboot automatically load one system by default. You must own both DOS 3.3 and ProDOS in order to create the Double-boot system.

■ **Recovering Deleted ProDOS Files** undoes accidental deletes. If you accidentally delete your file, this program will instantly recover it under ProDOS.

■ **ProDOS COPY Command** adds a COPY command to ProDOS for efficient file manipulation. Now you can conveniently copy files while you have a BASIC program in memory, and without resorting to the awkward FILER program. Use it to transfer files from within a BASIC program or an EXECable text file.

■ **ProDOS Directory List** lists every file in all the subdirectories on your ProDOS disks. No more searching through subdirectories for the file you want! Includes print options to the 40- or 80-column screen or printer.

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■**Floppy Copy** is a zippy disk copying program. This program uses your Apple's extra memory to reduce the number of disk swaps. Copy DOS 3.3, ProDOS, and Apple Pascal disks quickly and easily.

■**File Revival** is Sandy Mossberg's full-featured utility to recover files you've accidentally deleted. ProDOS 8 versions 1.3 and later preserve the directory information this powerful program need to reincarnate files inadvertently wiped off your disk, even if they were buried in a subdirectory.

■**OmniType** is a new ProDOS command that quickly shows you the contents of BASIC programs, as well as text, AppleWorks, and other files.

■**ProDOS Repro Command** is a powerful addition to ProDOS that copies entire directories with a single command. Move a directory of files from one volume to another quickly and easily, or load or clear your RAM disk by issuing a single command. You can speed up file transfer and hard disk backup, easily change the directory of your RAM disk, and selectively transfer only the latest version of your files.

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■**Screen Print Command** installs directly into ProDOS, giving you a handy way to print the contents of your text screen.

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Where can you get answers to all your Apple questions?

Ask Nibble of course! Send your questions to Ask Nibble, 52 Domino Dr., Concord, MA 01742.

Q My Apple IIc utilities have something called a PIN number that is used to set the serial port. What is this, and how do I set it in my own programs?

A PIN stands for "Peripheral Identification Number," which is a system devised by Apple for condensing the various peripheral port settings into one phrase, so to speak. The numbers in the PIN value represent an entire combination of individual settings. For example, you may have seen communications programs that tell you that the parity setting is "8N1." This translates to "8 data bits, no parity, 1 stop bit." Without digressing to what this specifically means, suffice it to say that 8N1 is just a condensed abbreviation for the combined settings. The PIN value works the same way. There is not a hardware register in the IIc that this value is POKEd into. Rather, it is just a quick way of entering a group of values into a specific utilty program that in turn sets the various parameters in the serial port. So, what does the abbreviation mean? The PIN value is a 7-digit code, where each position has the meaning shown in **Table 1.**

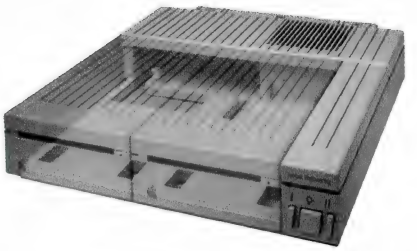
For a printer at 9600 baud, for example, the likely PIN number is 1561111. This tells the serial interface in the computer to be in the printer mode at 9600 baud, with a data protocol of 8N1 (8 data bits, no parity, 1 stop bit), and no echo of printed characters to the screen. The serial card will not add a line feed to each carriage return (the printer is probably set to do this automatically), and the serial port will not truncate lines at 80 characters (or any other value).

Note that this system is not specific to any particular computer, not even the Apple. Anybody that wanted to use this code could accept these definitions for the PIN value. In practice, the PIN seems to be used only by the Apple IIc, and requires a utility on the System Utility disk to take the PIN number and actually send the correct commands to the serial port to make good the desired settings.

If you want to use a PIN value in your own programs, you have to write a routine to take each character of the PIN string and send a specific command to the serial port.

continued on page 90

Roger Wagner is the president of Roger Wagner Publishing Inc., the publisher of MouseWrite and the Merlin Assembler, and the author of Assembly Lines: The Book *and* Apple IIGS: Assembly Language for Beginners.



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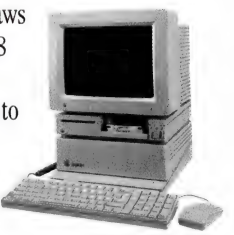

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by Neil Shapiro

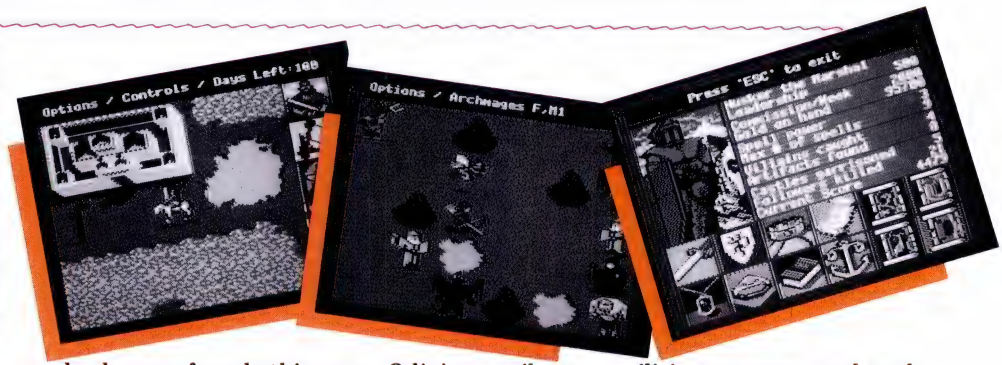
IT'S BETTER TO FEEL GOOD!

A lot of important ingredients go into the recipe of a great game. You can simmer it with plots and puzzles, baste it with action, and even present it complete with mouth-watering graphics. But unless you include the type of user-interface, the gamer's controls, that can be quickly learned and almost instinctively used then you have just designed a steak without any sizzle.

This month's three games all address the problem of how to make a game "feel" to the gamer in different, and rather unique, ways. All are successful to one degree or another and, even better, they all look as good as they feel. And even comedian Billy Crystal ("It's better to look good than to feel good!") couldn't find fault with that!

A Bountiful Pleasure

King's Bounty from New World Computing is an adventure game that I found I just couldn't stop playing. Unlike so many complex adventure games on the market, here's one that doesn't require the same mental effort to play as to learn College Physics. But the game itself is as deep, as rich in detail, and as convoluted in plotted concepts as the best of its rivals. But in the manner of play, it towers over most of the field.



First, let's get the plot out of the way. In this game, you are a hero who must recover good King Maximus' Scepter. The Scepter was stolen by the dragon Arech, the demon King Urthrax Killspite, and their assorted evil minions. With the Scepter out of his hands, King Maximus is sick, dying. And the land too is dying as more evil creatures begin to appear.

It's the kind of plot that could seem either really laughable or really interesting depending on the rulebook and scenario. This particular rulebook is written in a very nice prose style. Even better, it has been written by someone who knows mythology. The story has an intriguing depth. Readers who know of such things as Odin's Staff, The Wounded King, The Wasteland, and other myths will nod their heads as they read this latest rendition. Other readers will find themselves simply drawn in.

But the greatest story in the world would be nothing if the game could not be well played. In this case, a classic story and a perhaps soon-to-be classic game go hand- in-hand.

Controlled by keyboard, play is very simple. You move your party on an onscreen map of the world, continent by continent. Of course, your party is not the measly five or six adventurers of other games. In King's Bounty, entire armies accompany you.

The size of the armies depends on your leadership abilities; the better they are, the greater the size of the armies that will follow you. As you move about, you recruit archers and pikemen, militia, peasants, and such things as ogres and dwarves, orcs and elves to join you in your quest.

Your quest takes you from castle to castle in an attempt to capture all of Arech's henchmen (henchthings?) and to find the Scepter. Each time you capture an evil one, you get another piece of a map to show you where the Scepter is. You have, depending on game difficulty, a certain number of game days to find the Scepter.

Magic spells can be used (some character classes are better than others) while both adventuring and in combat.

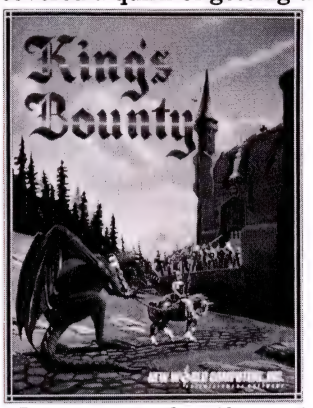
The evil ones hang out in various castles; you will want to "lay siege" to these castles to capture them. Thus, combat can happen in the open or in a castle. But, either way, it is done by tactically moving icons that represent your armies onscreen. Each icon is a

Neil Shapiro is founder and Chief Sysop of CompuServe's MAUG. Write to him at MCU Inc., P.O. Box 520, Bethpage, NY 11714.

little, animated representation of the type of being depicted — from scaly orcs with huge bows to fairytale-like sprites. The manual carries long and very detailed tables that allow you to plan your battles as to which type of army is better than another, what results to expect, and the like. There's no reason to have to start this game fifty times before knowing what you are doing.

And, hurray for automapping! As you move, the game keeps track of all the terrain, castles, towns, and recruiting spots that you have discovered. Of course, those who enjoy graph paper need not ever access the function but, for people like me, it's a welcome addition.

The only thing I found in the game that I considered a design flaw is that it's a bit too easy to go after the baddies. When you go into a town you get a "contract" on which bad 'un to go after. For example, my first contract was on Hack The Rogue. So, I went from castle to castle looking for him. I stumbled on some of his friends, but my contract was for Hack. But, later, I discovered a quirk of getting a con-



tract. It turns out that if you simply go to a town and keep asking you can sequentially cycle through different contracts. So, if you stumble onto Caneghor The Mystic while looking for Hack The Rogue, just go into any nearby town and change contracts!

Also, as mentioned, much of the game's basic appeal lies in the seriousness with which famous myths are treated and have been incorporated into play. So, I wish the programmer had not given in to humor in the naming of a few places such as Castle Kookamunga. I don't like when a game expects you to believe in it, and yet laughs at itself unexpectedly.

Still, how high would I rate King's Bounty? About as high as the tip of a double-handed broadsword brandished aloft by a tall giant! The game is a wonderful introduction to role-playing and is also deep enough to satisfy the most advanced dungeoneer. I give it my highest recommendation.

King's Bounty is available for the Apple IIe w/128K RAM from New World Computing, Inc., 2031 Ventura Blvd., Suite 200, Woodland Hills, CA 91364; (818) 999-0606. Includes disk, manual. Color monitor recommended.

Please circle 120 on Reader Service Card

Is It? It Ys!

The Ancient Land of Ys from Kyodai blends the idea of a role-playing game with the action and reflex excitement of arcade-style gaming. It's a new "feel" to adventuring that, I think, will find many enthusiasts.

It starts off in a town, as do many adventure games. There you use your joystick or keyboard to move about, talking to people and buying various supplies before setting out on your quest.

Your quest in this game is to recover the Six Books of Ys hidden by the evil wizard, Malificus. The books hold a secret, that secret being the magic metal Kureria. Find the books, and obtain the secret.

Of course, there are a lot of creatures out to stop you! How many? Remember how scientist and TV personality Carl Sagan would soulfully recite the term "bill-yuns and bill-yuns of stars?" Well, there are "bill-yuns and bill-yuns" of battles awaiting you in this wonderfully deadly land of Ys!

You fight creatures basically by bumping into them. Run into them, pounce on them, meander into them — but don't run into them head-to-head. The first few hours I played this game, I was toast! But then I realized that coming up behind one of the creatures before butting into it, circling underneath, and generally being a sneaky ol' gameplayer was the best way to pro-

long my onscreen life.

And, it's good that the first creatures are as plentiful and as relatively easy as they are. After a while, once you get the hang of the game, you will begin to get cocky. You will feel like someone in size 10 boots stomping on ants at a picnic.

But the game's no picnic all the way through. The first time you enter a place like the Silver Mine, you'll be in for quite a shock. In fact, I'm not sure I want to ruin the surprise here. So, skip the next paragraph if you don't want a hint of sorts.

Occasionally, you are going to find what are called in the arcades "boss" creatures. These are very large opponents as compared to the run-of-the-mill smaller, knock-into-'em-who-cares? variety. If you just bump your way into a Boss creature, good night Nurse! When you come up against a Boss, be sure that you save your game first. You will almost definitely be killed in the majority of battles that you fight against such creatures. Luckily, the save game feature works here. The key in such a fight is a two-pronged tactic of evade and attack. Most of your time will be spent in evasion. If a Boss touches you, it's like a flame touching a moth. But if you can continue to evade, there will be times when you can quickly dart in and leap up from below the creature. Remember, it seems that only shots from below have much effect on the creature's health. So, completely forget any sort of frontal assault here!

Besides the arcade feel, there are also a lot of adventure-type puzzles to think over. For example, you will find chests that you will not be able to get to until you put two and two together and figure out what an item of equipment is for. And, you will have to visit various places before other places in order to obtain keys and the like.

All in all, the Ancient Land Of Ys is a most interesting addition to the genre of role-playing. It shows that

you really can successfully combine arcade play with adventuring. Of course, like any arcade game, you may find it more frustrating to the beginner than the usual adventure. But, persevere and develop your skills. The payoff is an enjoyable game with its own unique and outstanding feel!

The Ancient Land Of Ys is available for the Apple IIGS from Kyodai, 58 Mitchell Blvd., San Rafael, CA 94903; (800) 521-6263. Includes two disks, manual.

Please circle 121 on Reader Service Card

A Fiery Finish

Firepower from Microillusions is an arcade tank battle with a few differences. For one thing it can be played player against player as well as one-player against the computer. In fact, in two-player mode, both players do not have to be in the same room, or even the same country. Play can be over the phone lines using any Hayes-compatible 1200- or 2400-baud modem.

In dual-player mode, the screen is divided into two windows. If it is player against player, each person sees his or her tank and radar display. If you are playing against an opponent via modem, one half of the screen is your playing area and the other half contains a window with a very simple terminal (telecommunications) program.

When you play against the computer, the screen is a little odd-appearing in that only one-half of the screen is utilized. The other half is simply black. Frankly, I would much rather have seen the one-player mode expanded graphically to take full advantage of the screen size and the optional, two-player modes settling for the windowed modes.

Control of the tank is by keyboard, joystick, or mouse. However, I found the mouse control to be almost unusable. I simply could not get the tank to respond very well at all to mouse input. But with the joystick or keyboard, the game is fast and playable.

Essentially, the idea is to avoid the enemy tanks and helicopters and to shoot them before they shoot you. Also, many of your soldiers are kept captive in buildings. Shoot the buildings and they run out to your tank; you must give them a ride back to the first-aid station.

Unfortunately, the little soldiers are just brown dots. I can't understand this as, in just a 48K machine, Broderbund in their classic game of Choplifter made quite personable little animated figures to rescue in much the same type of scenario.

Another drawback is there is no manual included! The instructions are just on disk and cannot be printed out. So, as you cannot refer to them during gameplay, it may call for some extra pregame readings onscreen.

But, even with the above problems, I found Firepower to be a very interesting and easy to play and "get into" game. It's one of the best ways around to take your IIGS "to the arcade."

Firepower for the IIGS (768K) is available from Microillusions, P.O. Box 3475, Granada Hills, CA 91394; (818) 360-3715. Includes disk but no manual (see above). Supports joystick, mouse, or keyboard and will utilize a modem for off-site play.

Please circle 122 on Reader Service Card

SPECIAL NOTE: In a previous column, I reviewed Qix for the Apple IIe from Taito. I mentioned that the display made play a bit difficult as it was hard to distinguish some of the enemies (the "sparks"). Well, the new IIGS version is super! If you have a IIGS and have been waiting for Qix — go for it!

the PAIN of typing Apple programs!

Typing perfect, error-free Applesoft programs from magazines and books is a pain. And machine language programs are even worse! With Applesoft, if you make an error you have to retype the whole program line. With machine language, you may have to go back and retype the WHOLE PROGRAM.

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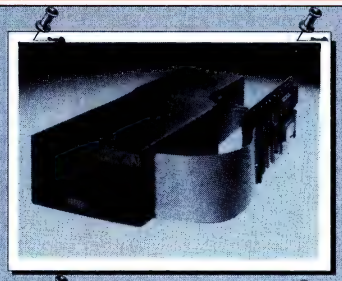

Vulcans have a 70 watt power supply to power the most fully equipped Apple. Use ProDOS, GS/OS, DOS 3.3, CP/AM or Apple Pascal operating systems. Vulcan runs in any slot except 3. Special low price on the top rated Vulcan internal hard drives. (specify computer)

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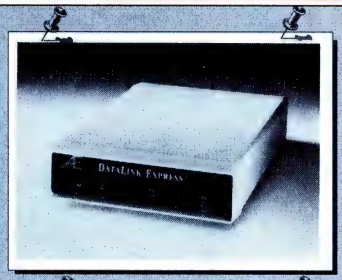

DataLink Express external modem includes software for Apple II, MS-DOS & Mac. Powerful user installable options allow you to add MNP5 error correction/data compression & Send FAX capabilities to your DataLink Express.

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DESKTOP DERRING-DO

■ **Publish It!** version 3 offers a host of new features, including: color printing capability, faster keyboard response time, improved graphics importing, increased PostScript support, AppleWorks 3.0 compatibility, Super Hi-Res image importing capability, PrintShop IIGS and Newsroom Graphics compatibility, and Cut, Copy, and Paste Groups. Upgrades to the new version will be available to all registered users for $30. Otherwise, Publish It! 3 costs $129.95. *Timeworks, 444 Lake Cook Road, Deerfield, IL 60015; (708) 948-7626.*

CIRCLE NUMBER 150

THE KEYS TO HAPPINESS

■ The **OmniMac Ultra** offers you a PC-style keyboard for the Apple IIGS. Among its many features are dual sets of function keys — 12 function keys on the left side and 12 across the top. The keyboard also has F13 print screen, F14 scroll lock, and F15 pause keys. The cursor-control keypad has arrow keys laid out in a comfortable diamond pattern instead of the commonly found "inverted T" shape. When a key is pressed, there is an audible click and a slight resistance, and then it springs back up when released. Yet another feature included is Caps Lock, Num Lock, and Scroll Lock LED indicators located above the numeric keypad. The OmniMac Ultra costs $159. *Northgate Computer Systems, P.O. Box 4100, Plymouth, MN 55441; (800) 548-1993.*

CIRCLE NUMBER 151

SPEEDY SCSI

■ Move information up to 10 times faster between Apple IIs and peripheral devices such as hard disks and CD-ROM drives. The new **Apple II High-Speed SCSI Card** provides the fastest data throughput available for the Apple IIe and Apple IIGS at no extra cost. The most noticeable improvement in speed is manifested in very large files; the larger the file, the greater the speed improvement. The speed improvement is mainly due to a new feature called direct memory access (DMA) data transfer. Data is transferred directly between the computer's memory and the SCSI peripheral, with minimal interaction from the Apple II's microprocessor. The new card transfers data on the IIGS at a rate of 1MB per second, and at .5MB per second on the IIe. In addition to DMA, the card features an updated SCSI manager and new firmware that also contribute to increased speed. The Apple II High-Speed SCSI Card costs $129, the same price as its predecessor. *Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014; (408) 996-1010.*

CIRCLE NUMBER 152

NETWORKS GO TO SCHOOL

■ To help educators understand the issues of computer networking, Scholastic Software has released a free 50-page **Scholastic Guide to Educational Computer Networks**. Scholastic has over 50 network software products that run on AppleTalk, Corvus/Apple, and other networks. *Scholastic Inc., P.O. Box 7501, 2931 East McCarty St., Jefferson City, MO, 65101; (800) 541-5513; in MO, (800) 392-2179.*

CIRCLE NUMBER 153

Pooling Resources

■ Watch tiny crab zoea getting caught in the stinging tentacles of the hydrozoan jellyfish. Marvel at hermit crabs trying out new shells in which to live. Spy on an octopus skulking for food and protecting itself with a jet of ink.

You don't have to travel to the North American sea coast. Just walk to your nearest Apple II, and **Exploring Tidepools**. Five fascinating activities are included in the program. Tidal Cycles helps students understand how tides are affected by the movement of the moon around the earth. East/West Tidepools allows students to compare and contrast West Coast tidepools with a typical New England tidepool. Students may also create their own tidepools within this activity. In Plankton Life Cycles, students gain greater knowledge of what happens to microscopic organisms brought in by the sea at the beginning of each tidal cycle. Who Eats Whom allows students to build food chains and webs of their own. And Reports/Graphs lets students generate both line and bar graphs using data gathered in other Exploring Tidepools activities.

Exploring Tidepools costs $75 and runs on the entire Apple II family; it includes two disks, backups, and a Teacher's Guide. *Sunburst Communications, Inc., Pleasantville, NY 10570; (914) 769-5030.*

CIRCLE NUMBER 154

More Than an Elephant Can Remember

■ New from Chinook Technology is a user upgradeable **4-megabyte RAM card** for the Apple IIGS and Apple IIe. It uses standard 1MB RAM chips and may be configured for 1, 2, or 4 megabytes of memory. The card is also DMA (Direct Memory Access) compatible, which means it will work with the new Apple II High-Speed SCSI Card. The RAM 400 costs $159 configured with 1 MB, $245 at 2MB, and $417 at 4 MB. *Chinook Technology, 601 Main Street* #635, Longmont, Colorado 80501; (303) 678-5544.

CIRCLE NUMBER 155

Raw Data

Apple II Software Sales Sliding

■ Statistics released by the Software Publisher's Association confirm what you may have deduced from the shelves of your Apple dealer...Apple II software is not a hot selling category. Overall Apple II software sales declined 28.8 percent in 1989 compared to 1988. In the same period, Macintosh sales increased 22.3 percent, and MS-DOS software was up 16.2 percent, and Commodore sales dropped 37.5 percent.

Using data from 152 software publishers, SPA estimates $42.4 million in Apple II software sales last year. MS-DOS sales were $698.5 million, and Macintosh $133.1 million.

Education software is the most lucrative category for Apple II publishers, grossing $18.5 million last year. However, even this corner of the market lost out to MS-DOS sales of $20.3 million. In comparisons to the prior year, Apple II education sales were down 12.9 percent, with Mac education up 31 percent and MS-DOS up 9.8 percent.

In other categories of software reported for the Apple II, annual sales declines were as follows: desktop publishing, 68.4 percent; graphics, 55.3 percent; recreation, 48 percent; word processors, 34.2 percent; other productivity, 27.6 percent; and integrated packages, 6.1 percent.

The SPA announcement focused on the MS-DOS and Macintosh markets and concluded "North American software sales are clearly on an upward trend."

by Rich Williams

Share Your DB

■ What can a developer do when he revises a good program to make it a great program? Release the older version as shareware, with hopes of enticing people to purchase the new version. That's what has happened with **DB Master 5.0**, now available for a shareware fee of $45 with a full instruction manual. This program is not by any means wimpy. It allows up to 200 fields per record, up to 250 characters per field, and files up to 10 megabytes, running on a hard disk or floppies. All sorting and searching functions are available, including a powerful report generator. Those who register as shareware users will receive a special offer for the relational DB Master Professional, which retails for $295. DB Master 5 and Professional will run on an enhanced Apple IIe, IIc, IIc Plus, IIGS, or Laser 128. *Stone Edge Technologies, P.O. Box 3200, Maple Glen, PA 19002; (215) 641-1825.*

CIRCLE NUMBER 156

A Disk With a View

■ **Kid-Leidoscope**, a wide-ranging current events magazine on disk with accompanying four-page newspaper, is geared toward students in grades 3-8. Each issue will include a newspaper featuring articles of high interest to students of these grade levels. The first issue focuses on Wildlife, and introduces Kleid, the reporter. Kleid guides students through the issue exploring such topics as the rain forests, extinct animals, and the plight of the dolphins. Subsequent Kid-Leidoscope issues will cover Living in Space, Fitness, Money, and Dinosaurs. Through the end of the year, the first issue will cost only $3 to cover shipping and handling. The cost per issue after that is $19.95, which includes a double-sided disk and accompanying newspaper. A five-issue subscription costs $79.95. *Methods and Solutions, Inc., 3130 North Dodge Blvd., Tucson, AZ 85716; (602) 322-6365.*

CIRCLE NUMBER 157

continued on page 90

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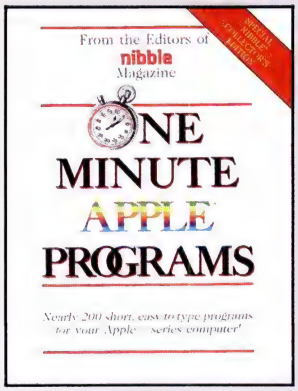
You'll Be Amazed At What

It only takes a Minute.



One Minute Apple Programs is packed with nearly 200 easy-to-enter, one- and two-line programs that do incredible things.

You'll like the functionality and power packed into each tiny program. After just one minute of easy typing, you can make your Apple screen come alive with a colorful kaleidoscope. Or, for more excitement, find your way out of a maze, elude a giant snake, or try to dodge the obstacles whizzing toward you on a race track.

Need a momentary diversion? Raise the curtain on a graphics picture, or fracture a text display and watch it fly off the screen.

You'll also get valuable utility programs and plenty of clever tips and routines to get more out of your Apple... and all it takes is a Minute! An optional disk is available with all the programs.

Get One Minute Apple Programs... for Hours of Fun.
Only $9.95 for the book and $10.00 for the disk.

Unlock the Secrets.

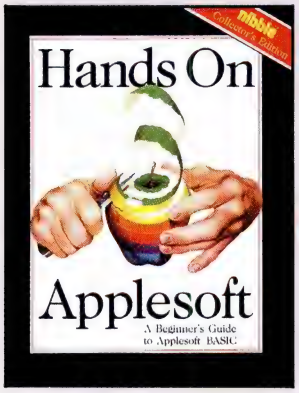
Learn the secrets locked inside your Apple with *Apple Secrets*. This unusual collection of 75 short programs and tips makes your Apple perform in ways you never thought possible.

You'll learn how to make your Apple accept ANY character from the keyboard; how to hide machine code in REM statements; how to make a program that cross references all your variables; and even make a screen scroller that moves your text wherever you want it. You'll create vivid graphics displays, speed up Applesoft, and much more.

Each of the 75 articles is a foolproof method for streamlining your programs, and most include subroutines you can use in your own programs. Even if you're a beginner, you'll enjoy putting your Apple through its paces. And you can even get the programs on an optional disk.

You'll be surprised at what you can do.
The book is $19.95... and the disk is only $10.00 more.

Applesoft is EASY.



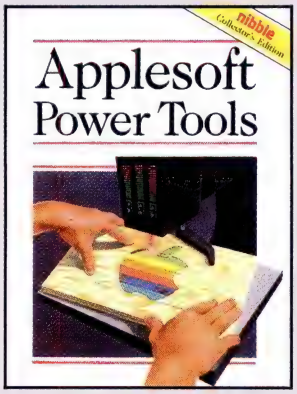
Hands On Applesoft helps you learn programming the easy way... by writing programs. It is a practical, step-by-step approach for beginners. You learn the art of creating Applesoft programs from start to finish at the keyboard.

Dozens of examples show you exactly how to write, modify, and debug your own programs. Hands On Applesoft shows you how to control your disk too. It includes easy to understand instructions for mastering disk operations.

Bugs! The chapters on debugging show you how to untangle the program errors and stamp out the bugs. Whether your goal is to tinker or to really learn programming, Hands On Applesoft is the place to start. And you can get an optional disk with all the program examples that includes Turbo Editor (for easy program entry) and Applesoft Tutor (for fast error checking).

Start Your Applesoft Adventure today.
The book is a bargain at $12.95... The disk is $14.95.

Plug into the Power.



Applesoft Power Tools is a library of easy-to-use and very powerful programming utilities. They'll help you to create faster, more professional programs with optimizers, program editors, and documentors.

You'll edit with ease, using the word processor-like features of Applesoft Turbo Editor. It will save you hours of typing. You'll seek and destroy bugs automatically with Programming Helper and Microscope.

You'll squeeze out excess code with the Crunchers, so your programs run fast and lean. Print formatted program listings, or cross reference your variables and the lines in which they appear. Add sound effects, or your own graphics. Or goof-proof your subroutines. You get them all — ready to type and run.

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Only $19.95 brings you the whole tool kit.

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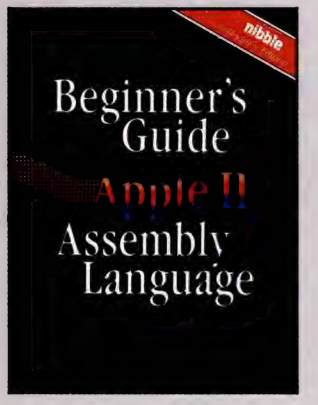
Lightning Fast Action.



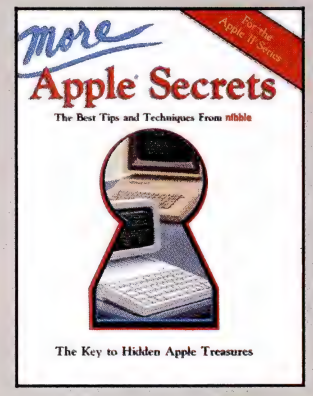
The Beginner's Guide to Assembly Language teaches you the nuts and bolts of the fastest, most powerful language for your Apple... Assembly Language.

You'll learn how to write fast, flexible routines that turn your Apple into a speed demon. The type of routines that produce professional graphics, full-range sound, and superfast arcade games. Learning is easy, because the book is loaded with side-by-side examples and comparisons to the language that is built into your Apple — Applesoft BASIC.

It puts you in command of the real benefits of Assembly Language: Speed, Power, and Compactness. You don't have to be a genius to learn it. The 12 chapters show you how. And you can even get the program examples on an optional disk.

The Beginner's Guide makes it fun to learn.
The book is $19.95... and the disk is only $10.00 more.

More Apple Secrets.



Uncover more mysteries hidden within your Apple with *More Apple Secrets*. It's a treasure trove of more than 70 of the best short Tips and Techniques from Nibble.

Nibble's experts teach you their tricks for creating Macintosh-like windows from Applesoft, automatically converting lower-case letters to upper-case, compressing Hi-Res pictures so that they take up less disk space, and speeding up programs enough to even *hear* the difference!

You can also learn how to add dozens of new colors to your graphics screen, hide FID in memory, add two-voice music and sound, and just customize your Apple's "beep".

All these programs and many more are yours with *More Apple Secrets*. And you can get the programs on an optional disk.

Discover the power within your Apple.
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The Nibble Library is a unique collection of books that contain hundreds of exciting and valuable programs for your Apple. All the programs have easy, step-by-step instructions for putting them into your Apple's memory; you don't have to be a programmer to type and run them. You'll also get comprehensive articles that describe how to use the programs and how they work.

Whether you have an Apple II, II Plus, IIe, IIc, or IIGS, you'll discover that it's a real thrill to see your first program running and to know that you did it yourself!

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B10☐	B11☐	Apple Secrets	$19.95	$10.00	$12.97	$6.50
B12☐	B13☐	More Apple Secrets	$19.95	$10.00	$12.97	$6.50
B18☐	B19☐	Beginners Guide to A/L	$19.95	$10.00	$12.97	$6.50
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by J. Morris Prosser

MEMORY MASTER

Memory Master is an extremely versatile memory editor. It displays a block of memory in both hexadecimal (hex) and ASCII and allows you to edit both directly. You can insert or delete bytes anywhere, and Memory Master either moves the affected memory above the point where bytes are inserted or deleted or "relocates" that part and adjusts addresses and branches accordingly throughout the entire program. It also provides a search facility to examine memory for a specified key, either a text string or a string of hex bytes. You can also move or relocate entire blocks of memory, or fill memory with a specified byte pattern. And you can look at disassembled code without leaving Memory Master. Memory Master runs under either DOS 3.3 or ProDOS without modification.

Why do you need Memory Master? There may be any number of reasons — here are just a few examples:

1. You have several short programs, running at various addresses, that you want to combine. Use Memory Master to relocate the segments.
2. A program that you're writing keeps growing until it has reached an upper limit in memory. Use Memory Master to relocate it to a lower address.
3. You have several programs that run in the same space, and you would like to have them in memory at the same time. Use Memory Master to relocate one or more of them.
4. You have typed in a machine-language program from a magazine article, but you have left out a few bytes or typed one or more bytes twice. Use Memory Master to insert or delete them.
5. You want to move, relocate, or edit a portion of memory for any reason. Use Memory Master to do it.
6. You want to look for a particular string of bytes as either hex bytes or ASCII characters. Find it with Memory Master.
7. You want to view a section of code to look for embedded text. You can see the text clearly with Memory Master.
8. You want to enter a hex dump published in a magazine.

J. Morris Prosser, 3157 Indian Village Rd., Pebble Beach, CA 93953. *This program is compatible with DOS 3.3 and ProDOS.*

You can do some of these things with an assembler/editor, but that is sometimes less convenient than merely BRUNning Memory Master. And if you don't have source code, you have to go to the trouble of generating it before you can reassemble the code at a different location.

USING THE PROGRAM

After BRUNning Memory Master, you enter ampersand (&) commands to use it. Acceptable forms of entry are "&$XXXX" (where XXXX is a hex address), "&S" for the search function, and "&R" for the relocate/move function. Entering "&" alone or with any other characters following will result in an error message and a reminder of the acceptable forms. The search and relocate/move functions are available from the display mode as well as directly from Applesoft. To exit Memory Master, press Q.

You invoke Memory Master's different commands by entering various modes. The following section explains each mode.

Cursor Mode

When you call Memory Master with a hex address, e.g., &$8000, a 128-byte block of memory is displayed on the screen in both hex and ASCII, with the address entered in the top line and a cursor at the top left of the display. The bottom of the screen contains a legend showing the various commands available. The ASCII display has all characters shown in normal mode, except that control characters are replaced with periods. The hex cursor is an inverse ">" and the ASCII cursor is an inverse display of the character at the cursor position — in the case of lowercase characters, the character at the cursor will be shown in inverse uppercase.

You can move the cursor in a number of ways. The I, J, K, and M keys (and the Arrow keys) move the cursor up, left, right, and down respectively. When the cursor reaches the right end of the line, the next entry of K or the Right-Arrow key causes the cursor to move to the left end of the next line down. The reverse action results from left moves. Up or down moves beyond the top or bottom lines of the display result in scrolling down or up as appropriate. For larger jumps, F (for forward) moves the display to the next 128 bytes, and B (for back) moves the display to the previous 128 bytes.

Hex Edit Mode

To get to the hex edit mode, enter H. A flashing cursor will appear and a new message will appear at the bottom of the screen. Entering hex digits now will replace the byte at the cursor position with the new entry, and the cursor will move to the right in position to edit the next byte. Entering any non-hex character will return to the cursor mode. This mode is particularly useful for entering code from a hex dump, since you can type in the bytes continuously, without entering spaces between bytes and without entering carriage returns. If you enter either of these, you will be returned to the cursor mode, since they are not hex characters.

Text Editing Mode

To get to the text editing mode, enter T. A message asking whether the high bit should be set or clear will appear at the bottom of the screen. Enter either S or C and the message will change. The cursor will also change to flashing. Typing any character except control characters will now cause the ASCII code for that character to replace the previous contents of the byte at the cursor position.

```
MEMORY MASTER                INS/DEL MODE:
(C) 1990 MINDCRAFT PUBL.      UNSPECIFIED
---------------------------------------
0800:>00 00 00 E8 0D DF 50 FF  ...h. P
0808: 08 20 D7 10 20 76 12 2C  . W. v.,
0810: 83 C0 2C 83 C0 A9 10 85  .@,.@)..
0818: E1 A9 D1 85 E9 A2 03 A0  a)Q.i".
0820: 00 84 E8 84 E0 B1 E0 91  ..h.010.
0828: E8 C8 D0 F9 E6 E9 E6 E1  hHPyfifa
0830: CA D0 F2 2C 82 C0 60 BA  JPr,.@0:
0838: 86 E6 20 21 0B A2 40 A9  .f !."@)
0840: 0E 20 F5 11 20 0C FD 29  . u. .})
0848: DF A2 05 CA 30 F6 DD 60  _".J0v]0
0850: 08 D0 F8 20 ED FD A9 08  .Px m}).
0858: 48 BD 65 08 48 86 E7 60  H=e.H.g0
0860: D1 C5 C4 D3 C1 5E 69 7F  QEDSA^i
0868: A6 87 20 E7 0A A5 E4 85  &. g.%d.
0870: E0 A5 E5 85 E1 20 1B 0A  0%e.a ..
0878: 20 FD 0A 20 97 08 F0 EA   }. ..pj
---------------------------------------
CURSOR: I,J,K,M   H)EX   T)EXT   R)ELOC
F)WD  B)ACK  S)RCH  C)ONT  L)IST  Q)UIT
CTRL-I)NSERT  CTRL-D)ELETE  CTRL-R)ESET
```

Figure 1: Memory Master Menu

Entering a carriage return (or any control character) exits to the cursor mode.

Relocate/Move Mode

To access the relocate/move function, enter R. You will be prompted to enter the starting and ending addresses of the block of memory to be relocated or moved and the starting address of the new location (destination).

Relocation means that all internal absolute address references (i.e. JMP, JSR, LDA, BIT, etc. referring to addresses within the block of memory to be relocated) will be changed to the corresponding addresses at the new location. In the case of a relocation, the start and end addresses entered should be those of the normal (run) location, even if it has been loaded at (or moved to) some other address. *Moving* a block of memory does just that — moves (copies) it from one location to another without changing it.

If you select relocation, you will be prompted for the present location of the block of memory. A default address will be shown (same as the start address), and if it is correct you can press Return to accept it. Otherwise, enter the starting location. At this point you will be asked whether all or part of the program is to be relocated (data, text, etc. should be moved, not relocated). If you want to relocate only parts of the program, you will be prompted to enter the start and end address of each segment. As you enter segment addresses, use addresses at the original location, whether or not it is the running location. This makes it easier to determine the segment's new start and end addresses.

When there are no more segments to be relocated, enter a carriage return alone. You will now be asked whether the block should be moved to the new location. You may want to have it remain where it is, perhaps to be saved back to disk, if the new location is otherwise occupied at the time. (If you have selected a move only, of course, the move will be executed immediately, with no further inputs.) Following the relocation or move, the display will return to the hex-ASCII dump in cursor mode, starting at the destination address (unless the block has not been moved, in which case the display will begin with the original address). Note that the relocation operation will take place at the address given for the present location, whether or not the block is moved.

Insert Mode

To get to the insert mode, press Control-I. You will be asked for the end address of the program or data to be edited. The reason for this is that all bytes from the cursor address to the end address will be moved up one position in memory for each byte that is inserted, so the program needs to know the end address. You will then be asked whether to relocate or move the bytes above the cursor position. The meanings of relocate and move are the same as above, except that in the insert mode it is necessary to check and correct all internal branches as well as absolute address references. If you use the relocate mode, you will be asked for the start address of the program to be edited, so these references can be checked. You will notice also that the INS/DEL MODE indicator at the top right of the screen will change as appropriate.

You can insert or delete bytes anywhere, and Memory Master will adjust the code automatically.

Inserting bytes follows the same procedure as the hex edit mode, with any non-hex entry returning to the cursor mode. The contents of memory locations above the cursor position will be moved up as each byte is inserted, and addresses will be corrected, except that any addresses entered in the current insert operation will not be changed. The end address entered must be above the cursor position and the start address must be below the cursor position or they will not be accepted.

Delete Mode

To enter the delete mode, press Control-D. If during the session you have already entered insert or delete mode and you have not moved the cursor outside the start and end addresses that you specified at that time, you will not be prompted for addresses. Regardless, the text at the bottom of the screen will change, telling you that pressing the Space bar deletes the byte at the cursor position, while pressing Return or another control character exits to the cursor mode. No other keys will be recognized. The contents of memory locations above the cursor position will be moved as bytes are deleted, but addresses will not be corrected until you exit delete mode. If the deletion extends to the end of the program, you will be returned to the cursor mode automatically when the end is reached. The last byte of the program cannot be deleted in this mode.

Search Mode

To get to the search mode, enter S. The display will change and you will be prompted for a search key. This may be either an ASCII string or a string of hex bytes. ASCII strings will be converted to uppercase, and during the search all bytes will be converted to uppercase normal for comparison. This means that any combination of upper-and lowercase, inverse, normal, or flashing can match the search key. If you want the search to be more specific, enter the hexadecimal equivalents as a hex search string.

Within the ASCII search key, you can use the asterisk (*) as a wild card for any character but the first and last. Hex search keys should be entered by first typing a dollar sign ($) and then hex bytes with a space between bytes, just as when entering bytes in the System Monitor. "AA" is a wild card for hex search keys.

If Memory Master finds the search key, the display will change to the cursor mode, with the matching string starting in the top row and the cursor positioned at the beginning of the string. To search for the next occurrence of the search key, enter C (for continue). When there are no more matching strings found, you will be so informed. You will also be informed if the search key is not found in memory within the specified search range. The start and end addresses for the search mode are not affected by the cursor position.

Reset Mode

To get to the reset mode, enter Control-R. This will give you the opportunity to change the start address of the hex-ASCII display. Enter a carriage return alone if you don't want to change it. The reset mode also resets the INS/DEL MODE to "UNSPECIFIED" and clears the flags which indicate that the end address has been entered and the INS/DEL MODE selected. Note that when you enter R (for relocate/move) the INS/DEL MODE is reset to "UNSPECIFIED" just as with Control-R, but the start address of the screen display will depend on the addresses entered for the relocation or move. The reason for this is that some of the same pointers are used in the relocate/move process, the insert/delete modes, and the hex-ASCII display.

List Mode

The list mode is entered by pressing L. In this mode, a disassembly list is displayed. The list is similar to the disassembly list available in the System Monitor, except that it shows only 16 lines, it can be single-stepped by pressing the Space bar, and it can be paused and restarted by pressing any key except Escape, which exits to the cursor mode. The start address of the hex-ASCII display is not changed. There is an additional command available when first entering the list mode. If the first byte occurs in the middle of an instruction, the disassembly will not be correct. Pressing the Left-arrow key backs up the start of the disassembly list one byte each time, but this occurs only before any other keys are pressed. After another key is pressed, the Left-arrow will start and stop the listing like any other key.

Quit

For a clean exit from Memory Master, press Q while in the cursor mode. This will restore the normal reset vectors and the zero page locations used by Memory Master. This is the only way to exit without adverse effects on other programming.

Notes

The memory range $C000 to $C0FF is not real memory, but is used for "soft switches" that control screen displays, peripherals, and so on. For this reason, addresses in this range should not be displayed or searched. Memory Master skips over this range of memory, going directly from

$BFFF to $C100 and vice versa. It does not check for moves to this range, so be careful not to move anything there.

If the address range you specify for a search includes the range $400 to $7FF, you may get one or more indications that the search key has been found, but the search key may not appear in the listing. This is because that is the text screen memory, and the text screen is changing as the memory dump is printed, so that what was found there by the search routine may not still be there when the listing is displayed. It is impossible to guarantee a completely accurate dump of this range of memory.

You can search for ASCII strings or hex bytes, and wild cards can be included.

Once a search key has been entered, it remains in memory and will be shown as a default, so that entering a carriage return causes the same search key to be used. If you want to change the search key, just type it in. When the first character is typed, the line will be cleared and your input will be accepted. If there is no search key, one must be entered.

Initially, the range of memory to be searched is defined as $0800 to $BFFF, which will be shown as defaults. If you want to search through this range, press Return when prompted for start and end addresses. If the relocate/move function is used, these addresses will be changed, since the same pointers are also used for these functions. If you enter different values, they will be retained as the default addresses.

When using the insert or delete modes, you may be undecided as to whether to use relocate or move. If you are modifying a working program, you would normally use the relocate mode. Be careful to insert or delete complete instructions (including operands) during any single insert or delete operation. Otherwise the program may make incorrect changes during the relocation process.

If you have entered a program from a hex dump, as printed in a magazine for example, you will probably want to use the move mode for inserting bytes you have omitted or deleting bytes you have repeated. In this case, the addresses would be correct if all the bytes have been entered correctly. Be aware that if the program being edited contains text or other data, it may be changed in the relocation process. For such cases, it is a good idea to save the data segments separately, replace their memory locations with something that disassembles as a one-byte instruction (e.g., $EA or $00), then move the data back in after editing. You could leave the data in place while editing, then replace it later, but there is some danger that relocations following the end of the data portion will be done incorrectly.

Note that, in the insert and delete modes, you cannot enter an end address lower than the cursor position or a start address higher than the cursor position. There is no error message, but the bell will sound and the input will not be accepted. In addition, if the cursor is positioned outside the previously entered start and end addresses, new ones will be requested when the insert or delete mode is entered.

In the relocate/move function, the move portion is similar to that available in the Apple System Monitor, with one exception. The Monitor's move function cannot be used to move a block to a higher memory location if the two ranges overlap, because it moves bytes starting from the bottom, which would overwrite some of the bytes to be moved. This program does not have that limitation; it can move even a large block of memory up either many or a few bytes, since it checks the direction of the move, and if the move is up it moves bytes starting from the top. Because of the way the Monitor move function works, it can be used to fill a block with a particular repeated byte pattern. If you want to do this with the routines in Memory Master, enter "F" (for fill) instead of "R" or "M" when prompted.

Be very careful when using the relocate functions, either in the relocate/move mode or in the insert or delete modes, since the program can be severely damaged if the wrong addresses are entered or if the program contains text or data. It is always a good idea to have a backup copy before modifying a program.

When using any function other than the hex-ASCII display, it is possible to cancel the operation and return to the hex-ASCII display by pressing the Escape key whenever an input is expected. If you have started to enter a search key or an address and want to cancel it and start over, press Escape; the cursor will return to the beginning of the input line and the line will be cleared. Of course you can also back up with the Left-Arrow. If the cursor is at the beginning of the input line, or if only a single keypress is expected, pressing Escape will immediately return you to the hex-ASCII display. If you are in the relocate/move mode, pressing Escape before the relocation or move has been made will prevent the relocation or move. Of course, if you have already relocated segments of a program, the changes will not be reversed. In this case it is best to start over with an unmodified version of the program.

In any of the other modes, pressing Escape will return you to the cursor mode.

Control-Reset always returns to the hex-ASCII display, but the start address of the display may be unpredictable, since the pointers for the start address of the display are also used in the relocate/move function.

One area that should not be edited is the zero page of memory. Many zero page locations are used by Memory Master and the Monitor, and some of those used by Applesoft are not reinitialized when returning to Applesoft. Use extreme caution if you change any of these locations.

If you want to run an Applesoft program with Memory Master in place, it is a good idea to set HIMEM:32768 before doing so, especially if the Applesoft program does any string manipulation. The safest thing to do in any case is to BRUN Memory Master just before using it.

ENTERING THE PROGRAM

Type in the hex codes from **Listing 1**, and save the program with

```
BSAVE MEMORY.MASTER,A$8000,L$14F2
```

Due to the excessive length of the source code for this program, we have chosen not to publish it. If you would like a copy of it, simply send a self-addressed stamped envelope to:

Nibble Memory Master
52 Domino Drive
Concord, MA 01742

and we'll send the source code to you at no cost.

THE JUNE 1990 DISK
CONTAINS THIS PROGRAM

If you'd rather not type in the listing for this program, you can buy it on disk, complete, free of typos and ready to run. *Nibble*'s June 1990 programs are available on a single disk for an introductory price of $12.95 from *Nibble*, 52 Domino Dr., Concord, MA 01742. Add $2.50 for shipping/handling within the U.S. and Canada; $7.50 for overseas air mail. Introductory price expires 8/31/90; after that date, the price will be $16.95. See the Nibble Software Directory in this issue for ordering information. **ORDER NO.: W32**

LISTING 1: MEMORY.MASTER

```
Start: 8000          Length: 14F2

76 | 8000:20 58 FF BA CA 18 BD 00
3C | 8008:01 69 1D 8D F6 03 E8 BD
08 | 8010:00 01 69 00 8D F7 03 A9
1C | 8018:4C 8D F5 03 4C D0 03 48
40 | 8020:A9 15 20 ED FD A2 27 B5
51 | 8028:D8 9D CA 94 CA 10 F8 A9
26 | 8030:00 85 DA 85 F5 85 F1 85
6D | 8038:F2 85 E9 85 EA 85 DD 85
6A | 8040:FC A9 08 85 DE 85 FD A9
3A | 8048:FF 85 FE A9 BF 85 FF AD
63 | 8050:F2 03 CD F6 03 D0 07 68
71 | 8058:20 B5 85 4C E9 80 8D C6
B4 | 8060:94 AD F3 03 8D C7 94 AD
83 | 8068:F6 03 8D F2 03 AD F7 03
C8 | 8070:8D F3 03 49 A5 8D F4 03
F7 | 8078:20 B5 85 68 C9 24 F0 1A
5F | 8080:C9 53 D0 03 4C EF 82 C9
1C | 8088:52 D0 03 4C CB 85 20 9E
A8 | 8090:87 2C F6 90 20 F8 8E 4C
1F | 8098:5F 8D A0 01 C8 B9 00 02
8A | 80A0:F0 29 C9 B8 D0 F6 C8 B9
5F | 80A8:00 02 D0 FA 99 02 02 88
45 | 80B0:B9 00 02 99 02 02 C9 B8
27 | 80B8:D0 F5 A9 44 99 00 02 C8
C1 | 80C0:A9 45 99 00 02 C8 A9 46
18 | 80C8:99 00 02 C0 03 90 BF A0
C6 | 80D0:FF C8 20 B1 00 F0 02 09
3E | 80D8:80 99 00 02 D0 F3 A0 00
C3 | 80E0:20 D8 8D C9 39 F0 05 D0
DA | 80E8:A5 20 7D 8D A2 F8 9A 20
37 | 80F0:1C 88 20 AD 87 20 54 88
74 | 80F8:20 AE 88 C9 C9 F0 04 C9
F3 | 8100:8B D0 03 4C 94 81 C9 CA
5E | 8108:F0 04 C9 88 D0 03 4C CF
4D | 8110:81 C9 CB F0 04 C9 95 D0
99 | 8118:06 20 BA 88 4C F8 80 C9
DE | 8120:CD F0 04 C9 8A D0 03 4C
41 | 8128:05 82 C9 C8 D0 03 4C 1F
D4 | 8130:82 C9 D4 D0 03 4C 8F 82
32 | 8138:C9 C6 D0 03 4C 28 88 C9
B3 | 8140:C2 D0 03 4C 3E 88 C9 D1
49 | 8148:D0 06 20 58 FC 4C 5F 8D
49 | 8150:C9 D3 D0 03 4C EF 82 C9
06 | 8158:C3 D0 0E A5 DB 85 3C A5
42 | 8160:DC 85 3D 20 BA FC 4C B5
46 | 8168:83 C9 89 D0 05 85 F1 4C
B3 | 8170:75 84 C9 84 D0 03 4C 99
74 | 8178:84 C9 92 D0 03 4C F1 88
F3 | 8180:C9 D2 D0 03 4C CB 85 C9
A7 | 8188:CC D0 03 4C EF 8D 20 9E
E6 | 8190:87 4C F8 80 A5 25 C9 04
99 | 8198:B0 27 20 27 89 38 A5 DD
90 | 81A0:E9 08 85 3C A5 DE E9 00
C3 | 81A8:85 3D C9 C0 D0 02 C6 3D
EF | 81B0:20 AD 87 20 35 89 A9 03
DB | 81B8:20 5B FB 20 61 88 4C F8
B4 | 81C0:80 20 78 88 C6 25 20 22
30 | 81C8:FC 20 61 88 4C F8 80 A5
6B | 81D0:24 C9 05 D0 1F 20 78 88
EE | 81D8:A9 1A 85 24 A9 26 85 F6
68 | 81E0:A5 25 C9 03 D0 06 20 27
96 | 81E8:89 4C 9D 81 C6 25 20 22
9D | 81F0:FC 4C FF 81 20 78 88 C6
EA | 81F8:24 C6 24 C6 24 C6 F6 20
B2 | 8200:61 88 4C F8 80 A5 25 C9
CE | 8208:12 D0 06 20 3E 89 4C F8
95 | 8210:80 20 78 88 E6 25 20 22
ED | 8218:FC 20 61 88 4C F8 80 20
9E | 8220:23 89 20 85 88 2C 2A 90
81 | 8228:20 F8 8E 20 30 89 20 87
2B | 8230:89 20 AE 88 20 5C 89 90
42 | 8238:03 4C E2 82 48 E6 24 20
9E | 8240:ED FD 20 AE 88 20 5C 89
25 | 8248:90 08 68 C6 24 C6 24 4C
8F | 8250:E2 82 8D 01 02 20 ED FD
C3 | 8258:68 8D 00 02 C6 24 C6 24
40 | 8260:C6 24 A9 8D 8D 02 02 A0
B7 | 8268:00 20 D8 8D A5 3E 85 F9
B0 | 8270:24 F1 10 15 20 98 89 20
B3 | 8278:BA 89 20 72 89 20 7D 8D
84 | 8280:20 23 89 20 AD 87 4C 2B
66 | 8288:82 20 6F 89 4C 31 82 20
ED | 8290:23 89 20 85 88 2C 15 94
7B | 8298:20 F8 8E 20 0C FD C9 D3
99 | 82A0:D0 04 A9 FF D0 0D C9 C3
7C | 82A8:F0 07 C9 9B D0 ED 4C E9
A7 | 82B0:80 A9 7F 85 D8 20 85 88
D1 | 82B8:2C 6A 90 20 F8 8E 20 30
5D | 82C0:89 20 87 89 20 AE 88 C9
B8 | 82C8:A0 90 17 25 D8 85 F9 E6
AB | 82D0:24 20 DA FD C6 24 C6 24
CF | 82D8:C6 24 A4 F6 20 6F 89 4C
84 | 82E0:C4 82 20 23 89 20 86 8D
CB | 82E8:A9 00 85 F1 4C F8 80 A9
02 | 82F0:02 20 5B FB 20 8E FD 20
01 | 82F8:42 FC A2 00 86 EB A9 02
12 | 8300:20 5B FB 2C 62 91 20 F8
E1 | 8308:8E A6 DA F0 32 A5 24 85
26 | 8310:EC A0 00 24 FB 30 10 B9
8A | 8318:80 02 20 ED FD C8 CA D0
51 | 8320:F6 A5 EC 85 24 D0 18 A9
9E | 8328:A4 20 ED FD B9 80 02 20
A2 | 8330:DA FD A9 A0 20 ED FD C8
56 | 8338:CA D0 F1 A5 EC 85 24 20
52 | 8340:84 8E E0 00 D0 0D A6 DA
3D | 8348:D0 06 20 9E 87 4C FE 82
59 | 8350:4C AA 83 A0 00 84 DA AD
BC | 8358:00 02 C9 A4 F0 1A 84 FB
35 | 8360:B9 00 02 C9 8D D0 03 4C
63 | 8368:AA 83 C9 C0 90 02 29 DF
28 | 8370:99 80 02 C8 E6 DA D0 E8
07 | 8378:85 FB A0 00 C8 B9 00 02
52 | 8380:C9 8D D0 03 4C AA 83 C9
6C | 8388:A0 D0 02 F0 EF 20 D8 8D
F2 | 8390:C9 99 F0 0A C9 C6 F0 06
68 | 8398:20 9E 87 4C FE 82 A6 DA
BE | 83A0:A5 3E 9D 80 02 E6 DA 88
79 | 83A8:D0 D3 20 02 8B A6 FC 86
52 | 83B0:3C A6 FD 86 3D A6 FE 86
2F | 83B8:3E A6 FF 86 3F E6 3E D0
0F | 83C0:02 E6 3F A6 DA 86 D9 A0
C7 | 83C8:00 A2 00 24 FB 30 3F BD
4B | 83D0:80 02 C9 AA F0 23 B1 3C
08 | 83D8:C9 A0 90 08 C9 E0 90 14
2D | 83E0:29 DF B0 10 C9 20 90 0C
AD | 83E8:C9 60 90 06 C9 80 B0 04
F2 | 83F0:29 DF 09 80 DD 80 02 D0
76 | 83F8:23 C8 E8 C6 D9 D0 D0 4C
15 | 8400:5A 84 4C 1C 84 C8 E8 C6
D9 | 8408:D9 D0 03 4C 5A 84 BD 80
1C | 8410:02 C9 AA F0 F0 D1 3C F0
36 | 8418:EC 4C 1C 84 20 BA FC B0
9B | 8420:0A A5 3D C9 C0 D0 9C E6
D2 | 8428:3D D0 98 24 EB 10 17 A9
A5 | 8430:02 20 5B FB 20 8E FD 20
B6 | 8438:42 FC 2C 21 92 20 F8 8E
85 | 8440:20 97 8B 4C E9 80 A9 02
EC | 8448:20 5B FB 20 8E FD 20 42
29 | 8450:FC 2C C4 91 20 F8 8E 4C
AD | 8458:3A 84 A2 FF 86 EB A5 3C
CC | 8460:85 DB A5 3D 85 DC 20 B5
BA | 8468:85 20 1C 88 20 AD 87 20
17 | 8470:91 88 4C F8 80 20 98 89
CB | 8478:A5 DF 85 E1 A5 E0 85 E2
82 | 8480:20 23 89 20 A9 8B 20 8F
34 | 8488:8D 20 85 88 A9 00 85 D9
1B | 8490:2C 95 92 20 F8 8E 4C 2B
F2 | 8498:82 20 98 89 A5 DF 85 E7
B9 | 84A0:A5 E0 85 E8 20 58 8D 20
83 | 84A8:23 89 20 A9 8B 20 41 8D
25 | 84B0:90 06 20 9E 87 4C 16 85
53 | 84B8:20 30 89 20 87 89 20 85
00 | 84C0:88 2C 04 93 20 F8 8E A9
F3 | 84C8:00 85 D9 20 30 89 20 87
1C | 84D0:89 20 AE 88 C9 A0 90 34
0D | 84D8:D0 F7 E6 D9 A5 DF 85 DB
06 | 84E0:A5 E0 85 DC A0 01 B1 DB
D0 | 84E8:88 91 DB A5 DB C5 EE A5
6B | 84F0:DC E5 EF E6 DB D0 02 E6
38 | 84F8:DC 90 E9 20 58 8D 20 41
82 | 8500:8D B0 09 20 7D 8D 20 AD
00 | 8508:87 4C CB 84 24 F0 10 06
4D | 8510:20 6B 8C 20 86 8D 38 A5
2D | 8518:EE E5 D9 85 EE A5 EF E9
D1 | 8520:00 85 EF 20 86 8D A9 00
70 | 8528:85 E9 85 EA 4C F8 80 20
C0 | 8530:9E 87 20 85 88 24 EA 10
D9 | 8538:08 2C AA 90 20 F8 8E F0
09 | 8540:06 2C 46 93 20 F8 8E 20
38 | 8548:97 8B 20 30 89 60 A5 DD
F0 | 8550:C5 E3 A5 DE E5 E4 B0 20
B1 | 8558:A5 E3 85 3C A5 E4 85 3D
5C | 8560:A5 EE 85 3E A5 EF 85 3F
A1 | 8568:A5 DD 85 42 A5 DE 85 43
42 | 8570:A0 00 20 2C FE 4C E9 80
E2 | 8578:38 A5 DD E5 E3 85 E1 A5
0D | 8580:DE E5 E4 85 E2 18 A5 FE
9A | 8588:65 E1 85 DF A5 FF 65 E2
AE | 8590:85 E0 A0 00 B1 FE 91 DF
88 | 8598:A5 FC C5 FE A5 FD E5 FF
80 | 85A0:A5 FE D0 02 C6 FF C6 FE
49 | 85A8:A5 DF D0 02 C6 E0 C6 DF
25 | 85B0:90 E0 4C E9 80 20 39 FB
BA | 85B8:20 93 FE 20 89 FE 20 58
E9 | 85C0:FC 2C 21 8F 20 F8 8E 20
E7 | 85C8:0A 89 60 20 0A 89 A9 FF
EE | 85D0:85 F5 A9 02 20 5B FB 20
2F | 85D8:8E FD 20 42 FC 2C A3 93
7D | 85E0:20 F8 8E 20 02 8B A5 FC
D4 | 85E8:85 E3 A5 FD 85 E4 A5 FE
AD | 85F0:85 EE A5 FF 85 EF A9 0A
64 | 85F8:20 5B FB 2C 8D 93 20 F8
C0 | 8600:8E 20 95 8D A5 3E 85 DD
1B | 8608:A5 3F 85 DE A9 0C 20 5B
AA | 8610:FB 2C 5C 94 20 F8 8E A9
AE | 8618:00 85 FA 20 0C FD C9 D2
89 | 8620:F0 15 C9 CD D0 03 4C 4E
25 | 8628:85 C9 C6 D0 03 4C 58 85
82 | 8630:C9 9B D0 D8 4C E9 80 A9
3D | 8638:0E 20 5B FB 2C E1 93 20
74 | 8640:F8 8E A5 24 85 EC A6 E3
80 | 8648:A5 E4 20 41 F9 A5 EC 85
67 | 8650:24 20 95 8D 8A F0 08 A5
FB | 8658:3E 85 E3 A5 3F 85 E4 38
E4 | 8660:A5 E3 E5 FC 85 DF A5 E4
E3 | 8668:E5 FD 85 E0 A9 10 20 5B
EE | 8670:FB 2C 34 94 20 F8 8E A9
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29 8678:00 85 F4 20 0C FD C9 C1
F1 8680:F0 27 C9 D0 F0 07 C9 9B
64 8688:D0 F1 4C E9 80 A9 FF 85
3F 8690:F4 A9 0E 20 5B FB 20 42
22 8698:FC 2C 52 94 20 F8 8E 2C
51 86A0:97 91 20 F8 8E 20 95 8D
01 86A8:8A F0 35 A5 3E 85 E3 A5
18 86B0:3F 85 E4 2C AE 91 20 F8
C2 86B8:8E 20 95 8D A5 3E 85 EE
DF 86C0:A5 3F 85 EF A5 E3 C5 EE
8F 86C8:A5 E4 E5 EF 90 0C 2C FE
B1 86D0:91 20 F8 8E 20 97 8B 4C
F3 86D8:91 86 20 3A 87 4C 91 86
42 86E0:18 A5 FC 65 DF 85 E3 A5
C2 86E8:FD 65 E0 85 E4 18 A5 FE
43 86F0:65 DF 85 EE A5 FF 65 E0
3C 86F8:85 EF A9 0F 20 5B FB 20
C7 8700:42 FC 2C F7 93 20 F8 8E
EB 8708:20 0C FD C9 CE F0 0E C9
DD 8710:D9 F0 06 C9 9B D0 F1 F0
69 8718:12 A9 FF 85 FA 24 F4 30
02 8720:03 20 3A 87 24 FA 10 03
87 8728:4C 4E 85 A5 E3 85 3C A5
B6 8730:E4 85 3D A9 00 85 F4 4C
1F 8738:E9 80 38 A5 DD E5 FC 85
4C 8740:E1 A5 DE E5 FD 85 E2 A5
C0 8748:E3 85 E5 A5 E4 85 E6 E6
1A 8750:FE D0 02 E6 FF A0 00 B1
F9 8758:E5 20 8E F8 A6 2F E0 02
88 8760:D0 2F 20 29 8D B1 E5 85
40 8768:E7 C8 B1 E5 85 E8 A5 E7
4F 8770:C5 FC A5 E8 E5 FD 90 1D
B1 8778:A5 E7 C5 FE A5 E8 E5 FF
03 8780:B0 13 A5 E7 65 E1 A0 00
4A 8788:91 E5 A5 E8 65 E2 C8 91
E0 8790:E5 E0 00 F0 03 20 29 8D
6F 8798:20 29 8D 90 B8 60 A9 A0
2B 87A0:A0 80 AA CA D0 FD 2C 30
97 87A8:C0 88 D0 F6 60 A9 02 20
8D 87B0:5B FB A9 00 85 24 A5 3C
77 87B8:29 F8 85 3C 85 DD A5 3D
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EE 8B30:85 FC A9 08 20 5B FB 2C
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F6 8B40:0F A5 24 85 EC A6 FE A5
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E2 8B60:FC C5 FE A5 FD E5 FF 90
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B1 8B70:97 8B 4C 02 8B A9 00 85
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E9 8B88:B0 0C 85 D9 A9 FF C5 3F
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14 8BA8:60 24 F2 10 1C 20 53 8C
BD 8BB0:90 05 20 0A 89 F0 12 24
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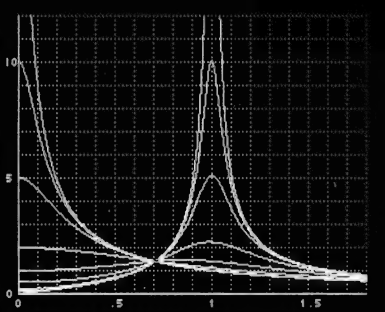

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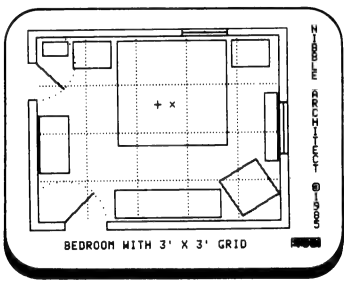

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LISTING 1: MEMORY.MASTER *continued*

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8F 8C08:DA 92 20 F8 8E F0 03 20
7B 8C10:9E 87 20 85 88 2C 60 92
50 8C18:20 F8 8E 20 95 8D 8A F0
0C 8C20:EE A5 3E 85 E3 A5 3F 85
0E 8C28:E4 20 5C 8C B0 E1 4C 7D
AC 8C30:8D C9 CD F0 0A C9 9B D0
07 8C38:BC 20 0A 89 4C E9 80 A9
1A 8C40:00 85 F0 A9 01 20 5B FB
DB 8C48:A9 1B 85 24 2C E9 92 20
DB 8C50:F8 8E 60 A5 DF C5 EE A5
10 8C58:E0 E5 EF 60 A4 E4 A6 E3
B3 8C60:D0 01 88 CA 8A C5 DF 98
91 8C68:E5 E0 60 A5 E3 85 E5 A5
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74 8C80:20 29 8D 90 EE 60 F0 35
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DB 8D10:10 ED 18 65 E7 85 E7 B0
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E3 8D48:EF 60 38 A5 E7 E5 D9 85
83 8D50:E7 A5 E8 E9 00 85 E8 60
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52 92E0:CF C3 C1 D4 C5 A0 A0 A0
6C 92E8:00 A0 A0 A0 A0 A0 CD CF
00 92F0:D6 C5 A0 A0 A0 A0 A0 00
52 92F8:D5 CE D3 D0 C5 C3 C9 C6

C2 9300:C9 C5 C4 00 8D BC D3 D0
4F 9308:C1 C3 C5 BE A0 C4 C5 CC
D7 9310:C5 D4 C5 D3 A0 C2 D9 D4
F8 9318:C5 A0 C1 D4 A0 C3 D5 D2
1D 9320:D3 CF D2 AE AE AE 8D BC
33 9328:D2 C5 D4 D5 D2 CE BE A0
D2 9330:C5 D8 C9 D4 D3 A0 D4 CF
3C 9338:A0 C3 D5 D2 D3 CF D2 A0
FE 9340:CD CF C4 C5 AE 00 CF CE
12 9348:C5 A0 CF D2 A0 CD CF D2
12 9350:C5 A0 C2 D2 C1 CE C3 C8
C7 9358:C5 D3 A0 C1 D4 A0 CC C9
2B 9360:CD C9 D4 AE A0 C1 CE D9
CD 9368:A0 CD CF D2 C5 8D C9 CE
2D 9370:D3 C5 D2 D4 C9 CF CE D3
F0 9378:A0 D7 C9 CC CC A0 C3 D2
C6 9380:C5 C1 D4 C5 A0 C5 D2 D2
FA 9388:CF D2 D3 AE 00 8D C4 C5
6F 9390:D3 D4 C9 CE C1 D4 C9 CF
BD 9398:CE A0 A8 C8 C5 D8 A9 BA
51 93A0:A0 A4 00 8D D2 C5 CC CF
C1 93A8:C3 C1 D4 C5 AF CD CF D6
3D 93B0:C5 A0 C2 CC CF C3 CB A0
EA 93B8:CF C6 A0 CD C5 CD CF D2
EA 93C0:D9 BA A0 00 8D CE C5 D7
E3 93C8:A0 D3 C3 D2 C5 C5 CE A0
BE 93D0:D3 D4 C1 D2 D4 A0 C1 C4
01 93D8:C4 D2 C5 D3 D3 BA A0 A4
E9 93E0:00 8D A0 D0 D2 C5 D3 C5
A7 93E8:CE D4 A0 CC CF C3 C1 D4
80 93F0:C9 CF CE BA A0 A4 00 8D
31 93F8:8D CD CF D6 C5 A0 D4 CF
65 9400:A0 C4 C5 D3 D4 C9 CE C1
09 9408:D4 C9 CF CE BF A0 A8 D9
4A 9410:AF CE A9 A0 00 8D C8 C9
E1 9418:C7 C8 A0 C2 C9 D4 A0 D3
FE 9420:C5 D4 A0 CF D2 A0 C3 CC
5B 9428:C5 C1 D2 BF A0 A8 D3 AF
F0 9430:C3 A9 A0 00 8D D2 C5 CC
B9 9438:CF C3 C1 D4 C5 A0 C1 CC
49 9440:CC A0 CF D2 A0 D0 C1 D2
39 9448:D4 BF A0 A8 C1 AF D0 A9
F3 9450:A0 00 8D D3 C5 C7 CD C5
A7 9458:CE D4 BA 00 8D D2 A9 C5
0D 9460:CC CF C3 C1 D4 C5 AC A0
5D 9468:CD A9 CF D6 C5 AC A0 CF
19 9470:D2 A0 C6 A9 C9 CC CC BA
44 9478:A0 00 8D BC C5 D3 C3 BE
22 9480:A0 D4 CF A0 C5 D8 C9 D4
96 9488:A0 AD A0 BC D3 D0 C1 C3
AE 9490:C5 BE A0 D4 CF A0 D3 C9
59 9498:CE C7 CC C5 AD D3 D4 C5
4C 94A0:D0 8D 8D A0 A0 A0 C1 CE
9A 94A8:D9 A0 CF D4 C8 C5 D2 A0
88 94B0:CB C5 D9 A0 D4 CF A0 D3
65 94B8:D4 CF D0 A0 C1 CE C4 A0
85 94C0:D3 D4 C1 D2 D4 00 00 00
A3 94C8:00 00 00 00 00 00 00 00
0A 94D0:00 00 00 00 00 00 00 00
19 94D8:00 00 00 00 00 00 00 00
DA 94E0:00 00 00 00 00 00 00 00
0B 94E8:00 00 00 00 00 00 00 00
2B 94F0:00 00

TOTAL: 2A01
```

END OF LISTING 1

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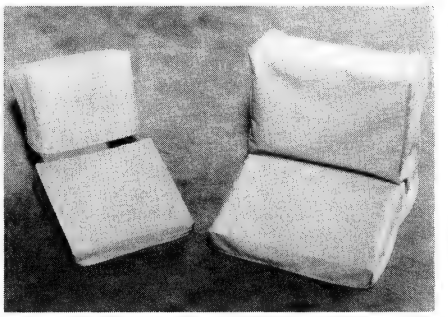

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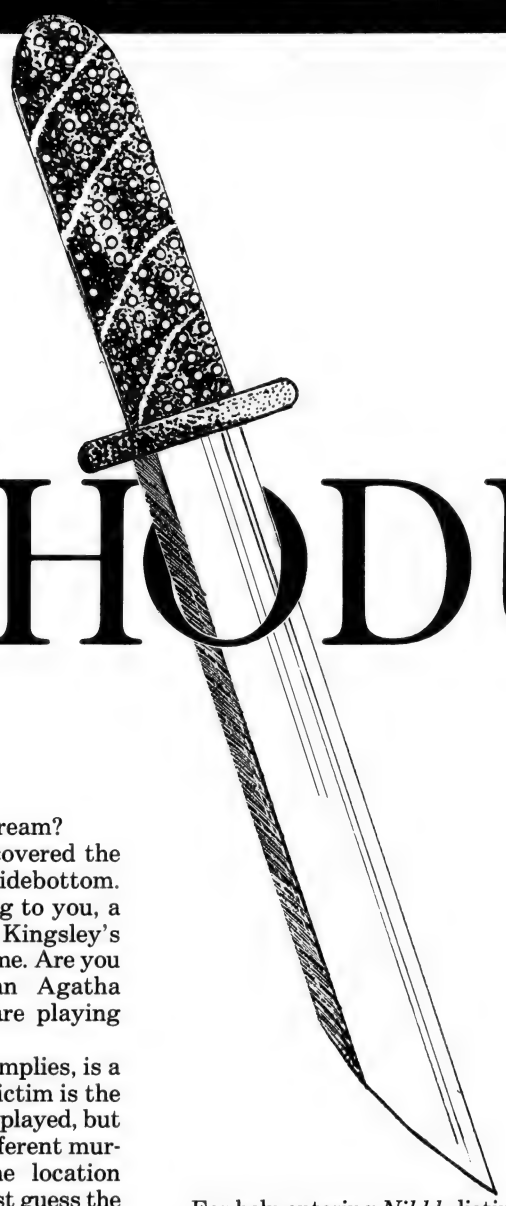

WHODUNIT

Examine the clues and finger the murderer

Did you hear that scream? Someone has discovered the body of Sylvester Sidebottom. The local police are turning to you, a weekend guest on Lord Kingsley's estate, to help solve the crime. Are you an amateur sleuth in an Agatha Christy novel? No, you are playing Whodunit.

Whodunit, as the name implies, is a crime-solving game. The victim is the same each time the game is played, but the computer assigns a different murderer, weapon, and crime location every game. The player must guess the solution.

You might, for instance, figure that Emma Ellsworth, the maid, used the dagger to kill Sylvester in the parlor. The program responds with evaluations of your choices. Through the process of elimination and logic, you'll solve the crime as you might in the popular board game Clue.

USING THE PROGRAM

Whodunit is a self-explanatory program. When you run Whodunit, you'll be given a set of sample instructions, and have access to some facts about the crime. Other facts will be withheld. Your job is to uncover those and guess the identity of the killer.

ENTERING THE PROGRAM

Type in the program from **Listing 1** and save it with the command

```
SAVE WHODUNIT
```

For help entering *Nibble* listings, see the Typing Tips section.

HOW THE PROGRAM WORKS

Lines 110-200 contain the graphics for the program title. The setting for the crime with descriptions of the characters is in **lines 280-370**. **Lines 390-410** direct the computer to choose the variables randomly. (Note the HGR2 statement in **line 90**. Putting the Hi-Res graphics on page 2 gets them out of the way and prevents chopping off the end of the program.)

In **lines 450-550** the player receives a clue which might or might not be helpful. Simple IF-THEN statements reveal the sex of the murderer, the nature of the weapon (with the appearance or omission of the word "bloody"), and the floor location of the room. Some facts, such as the sex of the hooded stranger, remain the game's secret.

Line 480 slows down the printing so the clue can be read and **Line 550** erases it as soon as it is complete.

The player is given simple instructions (**lines 580-600**), followed by a list of choices for guessing (**lines 630-730**). (When I wrote "Whodunit" I numbered the choices and had the player type in the numbers for his guess. I changed that system when I heard my family guessing numbers as they played, and paying no attention to the story angle.)

Lines 740-990 let you enter guesses and **lines 1010-1210** give the player a check for error. You can change a guess, with no effect on your performance, until you verify it.

The program evaluates your guesses and tells you if any or all of them are correct (**lines 1240-1370**). You can study your guess and the evaluation of it as long as you want. Any keypress sends you back to **line 620** to guess again.

The winning routine with description of the correct solution is in **lines 1390-1630**. This is followed by an option to replay, with a new crime.

Constance Fairbanks, 9462 Canfield Drive, La Habra, CA 90631. This program is compatible with DOS 3.3 and ProDOS.

```
SUSPECTS     WEAPONS     LOCATIONS

BUTLER       KNIFE       BEDROOM
KINGSLY      SPEAR       KITCHEN
VICTIM       POISON      LIBRARY
MAID         ROPE        DINING ROOM
LADY K.      DAGGER      PARLOR
STRANGER     GUN         GUN ROOM

WHO COMMITTED THE CRIME? B
WITH WHICH WEAPON? K
WHERE? K

THE BUTLER
DID IT WITH
THE KNIFE IN THE
KITCHEN.

IS THIS YOUR GUESS? Y

TWO THIRDS OF YOUR GUESS IS RIGHT.PRESS RETURN
TO TRY AGAIN.
```

Figure 1: Sample guess

MODIFICATIONS

As a veteran elementary school teacher, I recognize a learning device for promoting logical thinking. If you want a program for young children, you might convert it to "What's in the box?" using numbers, color words, and objects as variables. Clues might include descriptive words and categories (many, few, big, little, toys, pets, and so on). Graphics could be added to reveal correct answers.

LISTING 1: WHODUNIT

```
37 | 10  REM  *************************
C0 | 20  REM  * WHODUNIT               *
B9 | 30  REM  * BY CONSTANCE FAIRBANKS *
AE | 40  REM  * COPYRIGHT (C) 1990     *
CB | 50  REM  * MINDCRAFT PUBL. CORP.  *
24 | 60  REM  * CONCORD, MA 01742      *
45 | 70  REM  *************************
3A | 80  REM
22 | 90  PRINT  CHR$ (21): HGR2
B9 | 100  HCOLOR= 7
24 | 110  HPLOT 25,30 TO 35,70 TO 45,40 TO 55,70 TO
       65,30
E7 | 120  HPLOT 75,30 TO 75,70: HPLOT 75,50 TO 95,50
       : HPLOT 95,30 TO 95,70
D0 | 130  HPLOT 105,40 TO 115,30 TO 125,40 TO 125,60
       TO 115,70 TO 105,60 TO 105,40
DF | 140  HPLOT 135,30 TO 145,30 TO 155,40 TO 155,60
       TO 145,70 TO 135,70 TO 135,30
7E | 150  HPLOT 165,30 TO 165,70 TO 185,70 TO 185,30
43 | 160  HPLOT 195,70 TO 195,30 TO 215,70 TO 215,30
5C | 170  HPLOT 225,30 TO 225,70
64 | 180  HPLOT 235,30 TO 255,30: HPLOT 245,30 TO 24
       5,70
4F | 190  HPLOT 125,90 TO 135,80 TO 145,80 TO 155,90
       TO 155,100 TO 139,110 TO 139,130
4B | 200  HPLOT 139,136 TO 141,138 TO 139,140 TO 137
       ,138 TO 139,136
D1 | 210  FOR P = 1 TO 2000: NEXT P
E6 | 220  TEXT : HOME
B7 | 230  HTAB 10: PRINT "A CRIME SOLVING GAME"
9B | 240  PRINT : PRINT  TAB( 11)"BY CONNIE FAIRBANK
       S"
B2 | 250  HTAB 4: PRINT "(C) 1990 MINDCRAFT PUBL. CO
       RP."
B9 | 260  REM  ? SETTING ?
5F | 270  PRINT
3E | 280  PRINT "HERE IS YOUR CHANCE TO DISPLAY YOUR
           PROWESS AS AN AMATEUR DETECTIVE.  WHIL
       E YOU ARE VISITING ON THE COUNTRY ESTATE":
       REM  5 AND 2 SPACES
DF | 290  PRINT "OF LORD WILLIAM KINGSLY A CRIME WIL
       L BE COMMITTED.  THE LOCAL POLICE TURN TO Y
       OUFOR YOUR GUESSES AS TO THE CRIMINAL, THEW
       EAPON, AND THE SITE OF THE CRIME."
A0 | 300  PRINT : PRINT "INCLUDING LORD KINGSLY THER
       E ARE SIX    POSSIBLE SUSPECTS.  LADY KINGS
       LY, A MOSTGRACIOUS HOSTESS, IS OBVIOUSLY":
       REM  4 SPACES
CE | 310  PRINT "DISSATISFIED WITH HER MARRIAGE AND
       IN   LOVE WITH SYLVESTER SIDEBOTTOM, A
         WEEKEND HOUSEGUEST.": REM  3 AND 7 SPACES
B7 | 320  PRINT : PRINT "PRESS RETURN ";K$
EC | 330  GET K$: HOME
4C | 340  PRINT : PRINT "THE MAID'S NAME IS EMMA ELL
       SWORTH.  YOU HAVE NOTICED HER SNEAKING OUT
       OF A GUESTROOM LATE AT NIGHT."
3B | 350  PRINT
92 | 360  PRINT "SEBASTION, THE BUTLER, HAS JUST ANS
       WEREDTHE DOOR AND ADMITTED A STRANGER DRESS
       EDIN A HOODED PURPLE CAPE."
51 | 370  PRINT "DON'T OVERLOOK THE VICTIM AS A SUSP
       ECT.  IT MIGHT HAVE BEEN SUICIDE.": PRINT
9F | 380  REM  ? GENERATING CRIME ?
18 | 390 M =  INT (6 *  RND (1)) + 1
86 | 400 W =  INT (6 *  RND (1)) + 1
08 | 410 L =  INT (6 *  RND (1)) + 1
CB | 420  PRINT "DID YOU HEAR THAT SCREAM?  THE BODY
       OF  SYLVESTER SIDEBOTTOM HAS BEEN DISCOVER
       EDAND NOW YOUR WORK BEGINS."
F4 | 430  PRINT
B7 | 440  REM  ? CLUETIME ?
7A | 450  PRINT : PRINT "PUSH RETURN  TO GET AN IMPO
       RTANT CLUE.  READ IT CAREFULLY FOR THIS IS
       THE ONLY  TIME YOU WILL SEE IT.";C$
88 | 460  PRINT
66 | 470  GET C$
A4 | 480  SPEED= 50
C2 | 490  IF M < 4 THEN  PRINT "THE MURDERER LEFT HI
       S "
DC | 500  IF M > 3 THEN  PRINT "THE MURDERER LEFT HE
       R "
FF | 510  IF W < 4 THEN  PRINT "FINGERPRINTS IN THE
       BLOODY "
73 | 520  IF W > 3 THEN  PRINT "FINGERPRINTS IN THE
       "
33 | 530  IF L < 3 THEN  PRINT "GROUND FLOOR ROOM."
D1 | 540  IF L > 2 THEN  PRINT "UPSTAIRS ROOM."
98 | 550  SPEED= 255: HOME
03 | 560  REM  ? INSTRUCTIONS ?
B1 | 570 G = 0
60 | 580  PRINT "ANSWER THE POLICEMAN'S QUESTIONS WI
       TH   THE FIRST LETTER OF YOUR GUESS AND PRE
       SSTHE RETURN KEY."
FF | 590  PRINT
E7 | 600  PRINT "NOW PRESS RETURN  TO REVEAL POSSIBL
       E    SUSPECTS, WEAPONS AND SITES.";K$: REM
         4 SPACES
91 | 610  GET K$: HOME
B2 | 620  REM  ? CHOICES ?
C5 | 630  HOME
5E | 640  INVERSE
8D | 650  PRINT "SUSPECTS    WEAPONS    LOCATIONS":
       REM  4 AND 4 SPACES
C8 | 660  NORMAL
B8 | 670  PRINT
20 | 680  PRINT "BUTLER       KNIFE       BEDROOM": RE
       M  6 AND 6 SPACES
6B | 690  PRINT "KINGSLY     SPEAR       KITCHEN": RE
       M  5 AND 6 SPACES
B1 | 700  PRINT "VICTIM      POISON      LIBRARY": RE
       M  6 AND 5 SPACES
F3 | 710  PRINT "MAID        ROPE        DINING ROOM"
       : REM  8 AND 7 SPACES
FC | 720  PRINT "LADY K.     DAGGER      PARLOR": REM
         5 AND 5 SPACES
```

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LISTING 1: WHODUNIT *continued*

```
34  730  PRINT "STRANGER    GUN         GUN ROOM":
         PRINT : REM  4 AND 8 SPACES
47  740  VTAB 10: INPUT "WHO COMMITTED THE CRIME? "
         ;S$
D4  750  IF S$ = "B" THEN S = 1
36  760  IF S$ = "K" THEN S = 2
F7  770  IF S$ = "V" THEN S = 3
5B  780  IF S$ = "M" THEN S = 4
E1  790  IF S$ = "L" THEN S = 5
DA  800  IF S$ = "S" THEN S = 6
08  810  IF S > 0 AND S < 7 THEN  GOTO 830
05  820  GOTO 740
19  830  VTAB 12: INPUT "WITH WHICH WEAPON? ";A$
08  840  IF A$ = "K" THEN A = 1
F9  850  IF A$ = "S" THEN A = 2
82  860  IF A$ = "P" THEN A = 3
D0  870  IF A$ = "R" THEN A = 4
0C  880  IF A$ = "D" THEN A = 5
E9  890  IF A$ = "G" THEN A = 6
B6  900  IF A > 0 AND A < 7 THEN  GOTO 920
4C  910  GOTO 830
F5  920  VTAB 14: INPUT "WHERE? ";R$
DA  930  IF R$ = "B" THEN R = 1
D5  940  IF R$ = "K" THEN R = 2
1D  950  IF R$ = "L" THEN R = 3
2C  960  IF R$ = "D" THEN R = 4
C4  970  IF R$ = "P" THEN R = 5
B7  980  IF R$ = "G" THEN R = 6
57  990  IF R > 0 AND R < 7 THEN  GOTO 1010
32 1000  GOTO 920
C6 1010  PRINT : IF S = 1 THEN  PRINT "THE BUTLER
         "
AD 1020  IF S = 2 THEN  PRINT "LORD KINGSLY "
B3 1030  IF S = 3 THEN  PRINT "SYLVESTER"
3D 1040  IF S = 4 THEN  PRINT "EMMA, THE MAID, "
5F 1050  IF S = 5 THEN  PRINT "LADY KINGSLY "
27 1060  IF S = 6 THEN  PRINT "THE STRANGER "
3B 1070  PRINT "DID IT WITH "
0D 1080  IF A = 1 THEN  PRINT "THE KNIFE IN THE"
E4 1090  IF A = 2 THEN  PRINT "THE SPEAR IN THE"
12 1100  IF A = 3 THEN  PRINT "THE POISON IN THE"
59 1110  IF A = 4 THEN  PRINT "THE ROPE IN THE"
8B 1120  IF A = 5 THEN  PRINT "THE DAGGER IN THE"
04 1130  IF A = 6 THEN  PRINT "THE GUN IN THE"
9A 1140  IF R = 1 THEN  PRINT "BEDROOM."
8B 1150  IF R = 2 THEN  PRINT "KITCHEN."
D8 1160  IF R = 3 THEN  PRINT "LIBRARY."
DA 1170  IF R = 4 THEN  PRINT "DINING ROOM."
7B 1180  IF R = 5 THEN  PRINT "PARLOR."
94 1190  IF R = 6 THEN  PRINT "GUN ROOM."
C7 1200  PRINT : INPUT "IS THIS YOUR GUESS? ";A$
83 1210  IF A$ <  > "Y" THEN 620
51 1220 G = G + 1
77 1230  REM  ? ANALYSE GUESS ?
CE 1240 X = 0
29 1250  IF S = M THEN X = X + 1
CB 1260  IF A = W THEN X = X + 1
9F 1270  IF R = L THEN X = X + 1
53 1280  IF X = 0 THEN 1320
0C 1290  IF X = 1 THEN 1340
27 1300  IF X = 2 THEN 1360
B8 1310  IF X = 3 THEN 1380
74 1320  PRINT : PRINT "SORRY, ALL THREE PARTS OF
         YOUR GUESS    WERE WRONG. PRESS RETURN  TO
         TRY AGAIN.";Z$: REM  4 SPACES
0E 1330  GET Z$: GOTO 620
B6 1340  PRINT : PRINT "ONE THIRD OF YOUR GUESS IS
         RIGHT. PRESS RETURN  TO TRY AGAIN.";Z$
AE 1350  GET Z$: GOTO 620
22 1360  PRINT : PRINT "TWO THIRDS OF YOUR GUESS I
         S RIGHT.PRESS RETURN  TO TRY AGAIN.";Z$
76 1370  GET Z$: GOTO 620
3A 1380  REM  ? WINNING ROUTINE ?
2A 1390  HOME
57 1400  PRINT "CONGRATULATIONS! YOU SOLVED THE MY
         STERY."
39 1410  REM  ? SOLUTION ?
75 1420  IF M = 1 THEN  PRINT "THE BUTLER DID IT.
         HE USED THE"
4D 1430  IF M = 2 THEN  PRINT "LORD KINGSLY IS THE
         MURDERER USING THE"
7F 1440  IF M = 3 THEN  PRINT "SYLVESTER COMMITTED
         SUICIDE USING THE"
C8 1450  IF M = 4 THEN  PRINT "EMMA ELLSWORTH IS T
```

```
      HE CULPRIT COMMITTINGTHE DASTARDLY DEED WIT
      H THE"
7A    1460  IF M = 5 THEN  PRINT "LADY KINGSLY KILLED
      HER LOVER AFTER SHE HAD SPIED HIM IN A PAS
      SIONATE EMBRACE   WITH EMMA.  SHE SHREWDLY
      USED THE"
F2    1470  IF M = 6 THEN  PRINT "REMOVAL OF THE STRA
      NGER'S PURPLE CAPE   REVEALED THE SHAPELY F
      IGURE OF BUBBLES  O'TOOLE, SYLVESTER'S EX-W
      IFE WHO EKES   OUT A BARE LIVING AS A STRIP
      PER.  SHE   GOT HER REVENGE AT LAST WITH TH
      E"
19    1480  IF W = 1 THEN  PRINT "KNIFE. IT WAS FOUND
       IN THE GARDEN BELOW THE WINDOW ON THE EAST
       SIDE OF THE"
67    1490  IF W = 2 THEN  PRINT "SPEAR.  THE MURDERE
      R HAD REMOVED IT FROMITS RACK AND PLUNGED I
      T IN SYLVESTER'S  BACK AS HE STOOD IN THE"
8B    1500  IF W = 3 THEN  PRINT "POISONED CHAMPAGNE.
       AFTER THE KILLER   DRANK A TOAST TO THE V
      ICTIM THE GLASSES WERE SMASHED AND THE MURD
      ERER'S HAND    WAS CUT.  BLOOD WAS ALL OVER
       THE"
66    1510  IF W = 4 THEN  PRINT "ROPE.  SYLVESTER WA
      S FOUND HANGING FROM THE CHANDILIER IN THE"
20    1520  IF W = 5 THEN  PRINT "DAGGER.  THERE WERE
       NO BLOODY WOUNDS AS IT WAS THE HEAVY HANDL
      E THAT GOT        SYLVESTER IN THE TEMPLE.
       HE LAY ON THE FLOOR OF THE": REM  8 SPACES
EF    1530  IF W = 6 THEN  PRINT "GUN. THE POLICE FOU
      ND A BULLET HOLE IN  SYLVESTER AND 13 IN TH
      E WALLS OF THE"
F4    1540  IF L = 1 THEN  PRINT "COOK'S BEDROOM. BEI
      NG ON THE GROUND     FLOOR MAKES IT CONVENI
      ENT TO GET TO THE KITCHEN.:REM 5 SPACES
7F    1550  IF L = 2 THEN  PRINT "KITCHEN, A SUNNY AN
      D USUALLY HAPPY ROOM."
6A    1560  IF L = 3 THEN  PRINT "LIBRARY.  A COPY OF
       'CRIME & PUNISHMENT'LAY OPEN AT SYLVESTER'
      S FEET."
4C    1570  IF L = 4 THEN  PRINT "DINING ROOM.  THE C
      OOK HAD HEARD        STRANGE NOISES THROUGH
       THE OPEN DUMB    WAITER.": REM  8 AND 4 SP
      ACES
E2    1580  IF L = 5 THEN  PRINT "PARLOR.  THE ROOM I
      S A MESS AND MUST BE CLEANED FOR PEOPLE ARE
       SURE TO DROP BY  AFTER THE FUNERAL."
56    1590  IF L = 6 THEN  PRINT "GUN ROOM. QUITE APP
      ROPRIATE, DON'T YOU  THINK?"
64    1600  PRINT
A6    1610  IF G = 1 THEN  PRINT "YOU ACTUALLY SOLVED
       THE CRIME WITH YOUR FIRST GUESS!  WE ARE R
      ECOMMENDING YOU   FOR THE JOB OF HEAD OF TH
      E F.B.I."
04    1620  IF G > 1 AND G < 6 THEN  PRINT "YOU SOLVE
      D THE CRIME IN "G" GUESSES.YOU   ARE BEING
      PROMOTED TO CHIEF DETECTIVE."
2E    1630  IF G > 5 THEN  PRINT "YOU TOOK "G" GUESSE
      S TO SOLVE THIS CRIME.  SOME SLEUTH! SEE IF
       YOU CAN DO BETTER   THIS TIME."
D7    1640  PRINT
FA    1650  INPUT "DO YOU WANT TO PLAY AGAIN?";B$
8F    1660  IF B$ = "Y" THEN 220
EF    1670  PRINT
E8    1680  PRINT "COME BACK WHEN YOU WANT TO PLAY
            DETECTIVE AGAIN.": REM  9 SPACES

TOTAL: C207

END OF LISTING 1
```


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SPELLING & GRAMMAR CHECKERS

If you own a word processing program, you have surely heard of these fantastic little utilities called spelling checkers. Hearing of them is one thing; using them is quite another.

A spelling checker, as the term is commonly defined today, compares each word in your word processing document against lists of words called dictionaries. "Dictionary" is a slight misnomer here, since these programs will not give you definitions of words. The "dictionary" in a spelling checker or current word processing program is just a list of words.

When a spelling checker discovers a word not in its list, it flags that word and brings it to your attention. That, in a nutshell, is all a spelling checker does. It does not tell you that you used "there" where you should have used "their." Both are correctly spelled words. Once the word is flagged, how you process it further is up to you.

When the program flags a word, you are usually given several choices, possibly including changing the word yourself if you know the correct spelling; asking the program for a recommended alternative spelling of the word; skipping the word; ignoring the word completely; or adding it to a "custom" dictionary.

There are certain inherent values to this process. The spelling checker is tireless. It does not get eyestrain or fatigue, and it's just as attentive at the end of your document as it was at the beginning. It allows you more freedom to compose by letting you ignore typos. If you have a particularly troublesome word that is awkward to type, enter an intentionally misspelled very short word as a substitute for it. The first time the spelling checker encounters this word in the document, edit the word and tell the spelling checker to "replace all occurrences." This is a seldom-used but very powerful capability of spelling checkers.

Grammar checkers, on the other hand, are programmed to look for such problems as certain common mistakes in syntax; faulty use of phrases; overused, repetitive, racist, vague, or sexist words; capitalization; and punctuation errors. They are supposed to make you a more effective writer by pointing out your mistakes in these areas and allowing you to correct them to present a document conforming to current specifications or writing style preferences. They are not infallible.

```
The SENSIBLE SPELLER for ProDOS (1y)

Copyright 1987, Sensible Software, Inc.

    C - Check spelling of a document
    L - List dictionary words
    A - Add words to dictionary
    D - Delete words from dictionary
    Q - Quit speller program

Which would you like to do? [C]
```

Figure 1: Sensible Speller

Both tools are used after you have finished your first draft. They can improve your productivity by allowing you to concentrate on entering your thoughts as rapidly as you can type, leaving the proofreading and correcting chores till later.

One criterion for judging spelling checkers is the size of their dictionaries. This comparison, however, can be misleading. The method of constructing the dictionary can hide the true number of real words in that dictionary. A long list of words made up of root words and common prefixes and suffixes may contain actually fewer real words than a shorter list comprised of all real words. An overlarge dictionary can slow the search speed considerably.

Another factor is the ease with which you can add and delete words to custom dictionaries. This is important in these days of specialized terminology.

The ability to install the program to a hard disk or RAM is becoming increasingly important as memory requirements for programs increase.

The ability to customize the program to your needs and the availability of additional preprogrammed specialized word lists is also becoming more and more important.

Last, but certainly not least, are the hardware requirements for running the program.

Let us examine five currently available programs that can proofread your document for either spelling or grammar errors. For a quick summary of each products features, see **Table 1**.

Frank Dooling, 7305 Monticello Blvd., Springfield, VA 22150.

Table 1: Document Checker Features List

Product	Sensible Speller	AppleWorks 3.0	Timeout: Quickspell	Wordbench	Sensible Grammar
Type	Standalone	Built In	Integrated	Built in	Standalone
Dictionary Size	80,000	90,000	80,000	60,000	2,000 phrases
Origin	Random House Concise Ed.	Random House Concise Ed	Random House Concise Ed.	Oasis Systems	Empirical
Other Dicts. Available	Legal & Medical	None	None	None	None
Context Editing	Yes	Yes	Yes	Yes	Yes
Suggests Alternatives	Yes	Yes	Yes	Yes	Yes
Flags Double Words	No	Yes	Yes	No	Yes
Columns	40	80	80	80	80
Copy Protected	Yes	No	No	No	Yes
RAMdisk Use	Yes	Yes	Yes	Yes	Yes
Warranty	90 day	90 day	90 day	90 day	90 day
Comments	Comes with 3.5 & 5.25" disks	Comes with 3.5 & 5.25" disks	Comes with 3.5 & 5.25" disks	Comes with 3.5 & 5.25" disks	Comes with 3.5 & 5.25" disks

SENSIBLE SPELLER

Sensible Speller is a standalone program that has been around for a long time. It works with many ProDOS-based word processor files and has recently been upgraded for compatibility with AppleWorks 3.0. The dictionary, which includes 80,000 words, contains the official word list from the Concise Edition of the Random House Dictionary.

Sensible Speller uses an interface similar to AppleWorks 3.0 (see **Figure 1**). Once the file and the desired dictionary are selected, Sensible Speller checks all of the words in the document in alphabetical order. The program displays each letter of the alphabet to indicate the progress of the search. Upon completion of an initial search, you can print out a list of suspect words, and then repeat the search with another dictionary if desired.

The only error I found was in the use of the RAMCOPY routine to copy the program from the 5.25-inch disk to a hard drive. (The 3.5-inch disk copy worked correctly.) The problem is in the DATA statements of the RAMCOPY program. The program calls for a source disk named /GRAMMAR. This works fine for the front side of the disk, but the back side of the disk is named /PHRASES. The solution to this is to go into BASIC, load the RAMCOPY program, and add to the program the line

```
2170 DATA "/phrases"
```

Type RUN and enter the correct hard disk prefix when prompted. The RAMCOPY program will then execute properly.

Since this is an older generation program, it relies heavily on the use of ProDOS pathnames. If you're comfortable with this syntax, you'll find the program easy to use. You can use all available dictionary files to process your document simply by typing in the dictionary pathname when requested. This is not as effective as current point-and-click routines, but it is sufficient.

The documentation includes a number of screen shots and contains a tutorial called "20 Minutes to Sensible Spelling" that guides you through all necessary steps from backing up dictionary disks through demonstrating the checking of a sample file and creating a new dictionary.

Although the program's user interface may seem archaic to users of newer programs, it remains one of the few existing programs available capable of reading some of the older word processing program formats. Sensible Speller Version 1z, which should be released by publication time, is fully compatible with AppleWorks 3.0 word processing files.

APPLEWORKS 3.0

AppleWorks 3.0 runs on all models of the Apple II computer having at least 128K of RAM. The dictionary used in the program's spelling checker is an extension of the Random House dictionary, adding 10,000 common names and terms to that dictionary's 80,000 words.

Along with the Random House dictionary, AppleWorks 3.0 uses a custom dictionary. You can choose between alternative custom dictionaries, but you must select one before checking a document. You can also edit the custom dictionary. To start the spelling checker from within AppleWorks 3.0, your document must be in memory. Then press Open-Apple-V for Verify spelling.

The AppleWorks 3.0 spelling checker performs as described in the documentation (see **Figure 2**). When you select Verify spelling, Apple

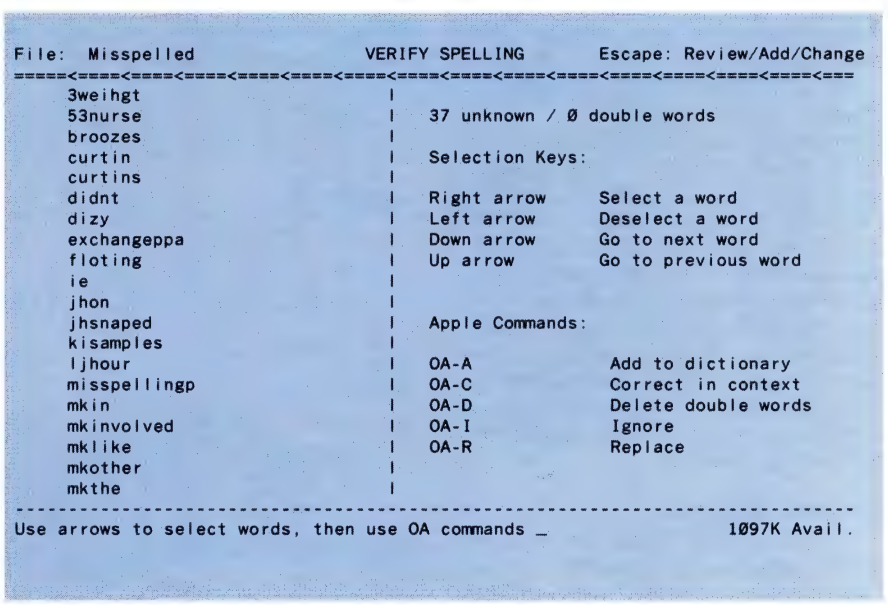

Figure 2: AppleWorks 3.0

Works displays a "thermometer" screen containing three progress indicators. The program quickly scans through the document and then scans the custom dictionary and main dictionary in that order. The program can check spelling in various ways, including from a list or in context, and will even give you a summary showing the original incorrect words along with the corrected versions. The comparison algorithm allows phonetic checking, rather than simply looking for initial letters in a given word. "Filosofikal" will result in a suggested word of "philosophical" using this program.

Like the rest of AppleWorks, the spelling checker forgives your input errors. Pressing Escape and following appropriate prompts will get you out of most normal situations. I tried many different entry and option selection errors and never did crash the program.

This area of the program is extremely easy to use. It follows the standard AppleWorks interface. If you're already familiar with AppleWorks, you'll have no problem with this spelling checker. One caution, however, is that you should ensure all the dictionaries you want to use are in the main AppleWorks program directory. For 5.25-inch disk users, these dictionaries should be on separate disks labeled /DICTIONARY.

The documentation for this program is extremely well done. Detailed examples usage are provided in both the AppleWorks Reference Manual and in the AppleWorks Tutorial. Illustrations containing functional flow charts and well-annotated actual screen examples are plentiful and easily understood.

The addition of the built-in spelling checker is one of the more useful improvements in AppleWorks 3.0. Its ability to identify potential misspelled words phonetically is a major improvement also, as is the capability to create lists of misspelled words. The one disadvantage is the necessity for the dictionaries to be in the same folder as the main AppleWorks 3.0 program. With sufficient additional memory, however, the entire AppleWorks program can be loaded into and run from a RAMdisk, which greatly improves processing speed.

TIMEOUT QUICKSPELL

TimeOut QuickSpell, the popular add-on program for AppleWorks, has been recently upgraded for compatibility with AppleWorks 3.0 files. The other prominent improvement in this version is the new algorithm, the same as that in the built in spelling checker contained in AppleWorks 3.0. This upgrade uses the same Concise Random House Dictionary as the previous version. The program works only with AppleWorks, not with any other word processing programs. It is easily installed in a backup copy of either AppleWorks 3.0 or 2.0 by following the instructions in the manual. As with all other TimeOut add-on programs, it is started from within AppleWorks by holding down the Open-Apple key and pressing the Escape key.

You can configure QuickSpell to look for dictionaries on any disk.

The new search algorithm allows QuickSpell to flag phonetically spelled words and find reasonable matches. Since it is compatible with earlier versions of AppleWorks as well as the new AppleWorks 3.0, this new feature is alone worth having. You can also configure QuickSpell to look for your custom dictionaries on any disk and not just within the main AppleWorks directory. It does not create summary lists of words as AppleWorks 3.0 and Sensible Speller do.

Error-handling is very good in this new version of QuickSpell. Even if you have forgotten to configure the program to locate the dictionaries, a simple press of the Escape key exits you to the previous menu where you can recover. If wrong words are added to the custom dictionary by accident, they can be deleted. Common disk and file location errors and their remedies are well documented in the manual.

Once installed in your AppleWorks program, QuickSpell 3.0 is very easy to use (see **Figure 3**). The menu choices are simple and concise. Once you start the spelling checker, you are given three alternatives at the bottom of the screen — document, screen, and word — indicating the portion of the document to be checked.

Clear and concise instructions for every aspect of the program are given in the short manual provided with the program. The manual contains actual screen examples of every menu with explanations of all choices. A complete tutorial is provided covering configuring dictionary locations and actually using QuickSpell. The Reference section covers each menu choice in detail. Finally, a Utilities section explains the utilities and suggests uses for any extra RAM available in your particular hardware configuration.

TimeOut QuickSpell 3.0 is not really necessary if you already have AppleWorks 3.0. But the program is also compatible with AppleWorks 2.1, so if you have the older version, upgrading to QuickSpell 3.0 does provide an improved spelling checker for AppleWorks 2.0.

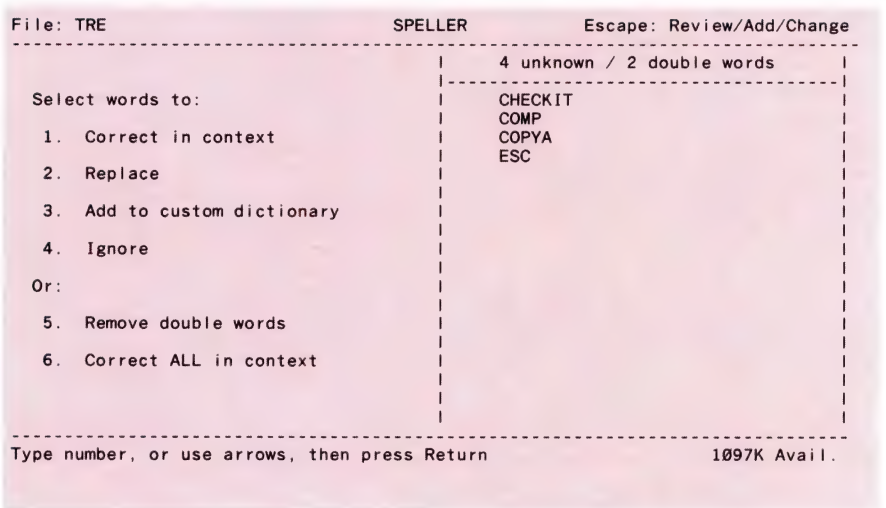

Figure 3: Timeout Quickspell

WORDBENCH

Wordbench, "the tool for people who write," is a relatively new program. Tailored primarily for academic use, it is different from other currently available word processing programs because of the linking capabilities between its Outliner, Reference Tool, and Writer modules.

Wordbench offers an Analysis mode that does more than just check the spelling of words, but it is not a full grammar checker. The several methods for analyzing text in Wordbench include checking the spelling of individual words (see **Figure 4**); counting the characters, words, and headings; marking words that match those in a personal word list; and collapsing the document to display only certain portions of text. I will discuss only the spelling and word-matching components here.

Wordbench uses a proprietary dictionary developed especially for computer applications by Oasis Systems. Depending on the amount of memory available, separate dictionaries can be merged to create a more comprehensive word list. The word-matching capability compares words in your documents to custom text-based word lists that you create. These word lists can be created in any word processor capable of saving ASCII (text) files or in Wordbench itself and converted to an ASCII file.

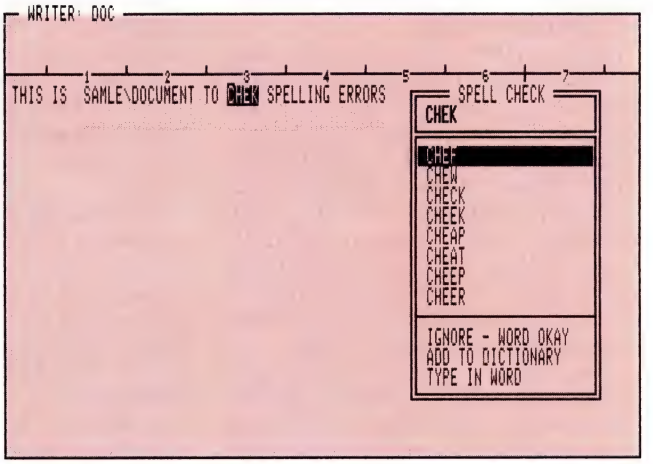

Figure 4: Wordbench

Wordbench uses a special dictionary developed by scanning thousands of documents and searching for the most commonly used words. It is not as large as some of the more popular dictionary models, but it contains more of the common words, thereby decreasing dictionary search time. The user interface may seem a little awkward at first, since it is not one that most of us are familiar with. However, I got used to it quickly.

Since nearly all the functions in Wordbench are "hot-keyed" (one keypress and no need to press Return), it is very difficult to make operational errors in this program. When you move to a different module within Wordbench, your file is automatically saved, a sometimes distracting but very handy procedure that prevents inadvertent loss of data.

No real bugs popped up during the evaluation of this product. One quirk of the spelling checker is that it does not recognize punctuation as a part of a word. Because of this, when you use Wordbench the first few times, it initially marks every contraction in your document as a potentially misspelled word. If you know that each of these words is correct, however, you can "Add to Dictionary" whatever portion of the word it identifies. The next time the word occurs it will not be identified as incorrect. Not many documents are required before you have sufficient words added to your dictionary to overcome this little quirk.

Once you become familiar with the hot-key menu selections, navigating Wordbench becomes almost second nature. Entering the Analyze function, for instance, is as easy as either pressing "A" or using the Arrow keys to highlight the "Analyze" function while in the Writer module. You then select a method of text analysis from the list of choices presented, and Wordbench does the rest. The only preliminary setup required in this program is entering the Folder Manager function and defining where the different required folders are located within your storage device system. This is a very easy program to use.

Wordbench's set of manuals is among the best I've seen in years.

Wordbench comes with excellent documentation. Three separate well-bound manuals are included in the package: a full tutorial, a user's guide, and a reference manual. The package also includes a plastic laminated quick reference card containing blank spaces to write in your own "shortcuts" (macros) for even further increasing the functionality of the program. This set of reference manuals is among the best I've seen in the past few years.

Wordbench, although tailored primarily for academic use, is a fully functional word processor. Its one shortcoming is its difficulty recognizing contractions. This design consideration is understandable, however, since Wordbench is designed for more formal writing where contractions are usually not desirable. After processing a few documents and adding the contraction word parts to the dictionary, this problem disappears. The special "high frequency use" dictionary increases the efficiency of the search.

SENSIBLE GRAMMAR

Sensible Grammar is a fast and easy to use stand-alone electronic proofreader that checks your word processing files for common writing errors. It compares your writing against a library of over 2,000 phrases to identify pompous, informal, cliche, vague, wordy, repetitive, racist, sexist and other "faulty" phrases. It also checks for correct punctuation.

Sensible Grammar checks your document files after they have been saved from your word processor. This allows it to preserve formatting information for files created in those programs with which it is directly compatible. When Sensible Grammar finds a potential problem phrase in your document, it displays the entire sentence containing the problem and explains what is wrong with it (see **Figure 5**). You can then use any of the editing tools to correct the sentence. When the search algorithm encounters an error, it automatically suggests alternate wordings that may be more proper. A keystroke shows you each suggested alternative wording as it would appear in your sentence. You can then either insert the suggested

version into your sentence or leave it as originally written.

Sensible Grammar requires at least a 128K Apple IIe or newer model Apple IIc, IIc Plus, or IIGS computer. It imports files directly from AppleWorks 2.1 and 3.0, AppleWriter (ProDOS), and most of the older word processor formats. Newer word processors with custom formats require first saving or printing the files to disk as ASCII text files in ProDOS. The program comes with one 5.25-inch and one 3.5-inch program disk.

A word of caution: This style of program identifies only common potential errors. What might be an error in one style of writing is entirely proper in another. While grammar is a set of rules, style is knowing how to use and break those rules; this program is no substitute for knowing proper English grammar or having additional style references nearby to resolve questionable syntax or grammatical construction. Sensible Grammar is best at catching common misuse of phrases. As the author, you remain the final judge of what is proper. Many times your original wording will be correct for the thoughts you are expressing in that particular context.

Escape and Cancel options are available at nearly every decision point in this program. If you have entered an incorrect phrase, simply select Escape or Cancel and your entry will be ignored. I couldn't crash the program no matter what I entered. There was always an adequate escape method.

Sensible Grammar is very easy to learn and use. Simple menu items, selectable by either mouse or Arrow key movement, require no typing in of directory or folder paths. A Quick Configure choice allows you to select the proper document format very easily, and phrases can be added to the library.

The well-organized 68-page manual contains a comprehensive "15 Minutes to Sensible Grammar" tutorial that leads you step by step through all programs and all the possible types of errors it is programmed to identify. Many well-annotated screen shot examples are provided. Detailed instructions are also provided for installing the program on a hard disk. A special "warning" page is provided to ensure that you have the program properly configured for your particular word processor before using it to proofread any of your files. Software replacement policies and customer support information are provided in the front of the manual.

Sensible Grammar is the only currently available grammar checker that works on most Apple II configurations. Its stand-alone capability is especially desirable if you receive or produce documents from different word processor formats. It will not recognize single-word spelling errors, so you need a full-featured spelling checker for initial proofreading. Sensible Grammar will not catch all errors. It identifies commonly misused phrases and punctuation. The user is still responsible for recognizing and correcting individual phrase errors.

CONCLUSION

Spelling and grammar checkers are not infallible; you still must rely on human intelligence to tell the difference between "too," "two," and "to," between "its" and "it's", and other common traps. But they can serve as a second pair of eyes that can find mistakes you might miss, giving your documents one more chance at improvement.

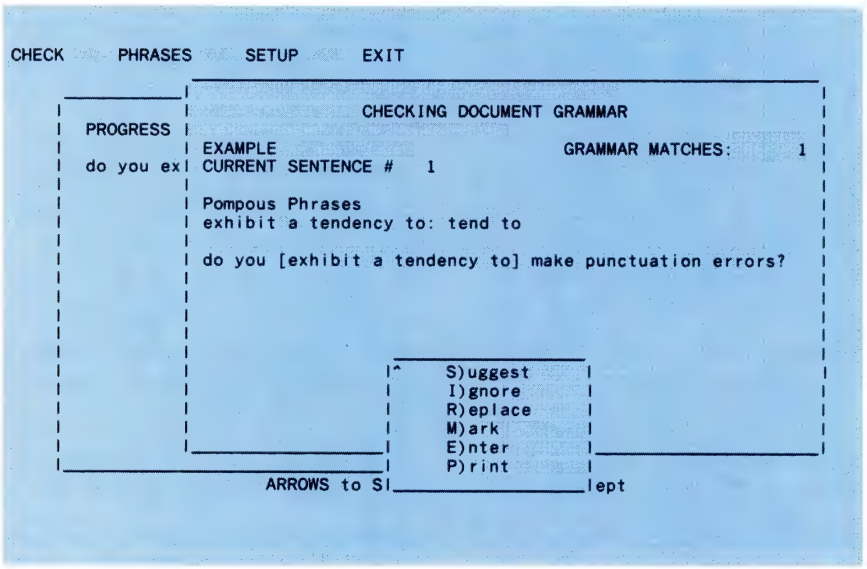

Figure 5: Sensible Grammar

LEGEND: ●●●●● = Excellent
●●●●◐ = Very Good
●●●◐◐ = Good
●●◐◐◐ = Fair
●◐◐◐◐ = Poor

Nibble Review Card

The Sensible Speller
Sensible Software, Inc.
335 E. Big Beaver, Suite 207
Troy, MI 48083
(313) 528-1950
List Price: $125

CATEGORY	RATING
Performance	●●●●◐
Error Handling	●●●●◐
Ease of Use	●●●◐◐
Documentation	●●●●●
Overall Rating	●●●●◐

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Nibble Review Card

AppleWorks 3.0
Claris Corporation
440 Clyde Avenue
Mountain View, CA 94043
(408) 987-7000 (new)
List Price: $249

CATEGORY	RATING
Performance	●●●●●
Error Handling	●●●●◐
Ease of Use	●●●●●
Documentation	●●●●●
Overall Rating	●●●●●

Please circle 102 on Reader Service Card

Nibble Review Card

Timeout: Quickspell

Beagle Bros, Inc.
6215 Ferris Square, Suite 100
San Diego, CA 92121
(619) 452-5500
List Price: $69.95

CATEGORY	RATING
Performance	4
Error Handling	3
Ease of Use	4
Documentation	4
Overall Rating	4

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Volume 4

The Apple According to Mossberg

Disassembly Lines

Sandy Mossberg has been exploring, dissecting and demonstrating the machine language that lies beneath Applesoft, DOS and ProDOS in the pages of *Nibble* for over five years. His Disassembly Lines column has entertained and educated thousands of fascinated readers. His work is available in these special book and disk packages. Each volume comes with a disk containing all disassemblies and demonstration programs. ProDOS disassemblies are in Big Mac/Merlin Assembler format.

Disassembly Lines Volume 1 is a collection of the first eight installments of Sandy's column. You'll learn how to use Applesoft machine language in your own programs; how to build an Applesoft Line Editor; how Applesoft handles hex/dec data conversion, program listing and keyboard buffers; and how to make full use of the extended memory of your 64K Apple.

Disassembly Lines Volume 2 delves deeply into DOS 3.3. It explores the base conversion routines, keyboard and video intercepts, and command parsing and processing. An in-depth discussion of the DOS 3.3 File Manager spotlights each DOS 3.3 command in detail. The disk includes an **unpublished bonus:** source files (in Big Mac/Merlin format) for each of the major tables in Applesoft and DOS 3.3!

Disassembly Lines Volume 3 reveals the inner secrets of ProDOS in nine intriguing installments. Learn about the BASIC interpreter and how it identifies your machine; how ProDOS performs speedy "garbage collection" on old strings; how input/output are processed; and how BASIC commands are parsed and interpreted. Find out how to control ProDOS through the global page and buffer management system.

Disassembly Lines Volume 4 explores the second half of the BASIC interpreter, with the focus on commands. Sandy dissects the ProDOS command handlers and the Applesoft BASIC file commands, showing you exactly how commands like CAT and BRUN work. He fixes a bug in BSAVE, and explains the code that ProDOS uses to create a RAM disk.

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SWITCHED ON GRAPHICS

The hard facts about soft switches

Sound, color, and motion. My English teacher always repeated these words when she discussed vivid, effective writing. Computer programming is much the same; these three elements can bring a dull Applesoft program to life. This series discusses placing graphics and animation in a program to create effective presentations. In this first article, we review high-resolution graphics and the Apple display soft-switches. Later, we will discuss special drawing techniques, shape tables, and animation secrets that the pros use. We will conclude the series with a brief focus on integrating sound into your programs.

Apple computers have a wide array of display modes. The text screen, 40 or 80 columns wide by 24 rows tall, is especially suitable for showing words and numbers. However, the old maxim "A picture is worth a thousand words" applies especially well to computers. A graph of an equation or an illustration makes obvious what a detailed description cannot. Low-resolution graphics, providing a display window 40 columns by 40 rows, is useful for some games, such as Pong. High-resolution graphics, with 280 columns by 192 rows, is even more useful. This high-resolution mode will be the focus of this series. Newer Apples support a plethora of other modes, including double low-resolution, double high-resolution, and super high-resolution. These modes, however, are more difficult to access from Applesoft.

High-resolution graphics gets its name because, in the original Apple II computer, this mode had the greatest resolution, i.e. the most dots per inch. For the rest of this article, I may refer to this mode as high-resolution or simply Hi-Res. Also, I will assume that you are fluent in Applesoft BASIC and know about the PEEK and POKE commands. In later articles, some hexadecimal numbers and a bit of machine language will be used, but don't worry if you do not know the arcane art. Since the graphics commands are of paramount importance, we will introduce them at this point.

Table 1: Standard Monitor Colors

Standard	Monitor
0) black	4) black
1) green	5) depends on TV
2) blue	6) depends on TV
3) white	7) white

Table 2: IIGS RGB Colors

Apple IIGS RGB Monitor	
0) black	4) black
1) green	5) orange
2) magenta	6) blue
3) white	7) white

APPLESOFT BASIC GRAPHICS COMMANDS

Applesoft provides four built-in commands for manipulating the high-resolution graphics screen. They are: HGR, HGR2, HCOLOR=, and HPLOT. They can be used from the Applesoft prompt or within a program. Each is detailed below.

HGR: The Apple can display either of two high-resolution screens in its memory. These

David Harris, 1112 Evelyn Court, Ridgecrest, CA 93555.
This program is compatible with all Apple IIs.

are called page 1 and page 2. The HGR command displays the first page and clears it to black. The screen is 280 pixels wide (0-279) and 160 pixels tall (0-159). A text window four lines tall is left at the bottom of the screen. An example of this command is

```
10 HGR
```

HGR2: This command is similar to HGR, but acts upon page 2. A field 280 pixels wide by 192 pixels tall (0-191) is displayed, but no text window is visible. In a BASIC program, you might use

```
20 HGR2
```

HCOLOR=: This command is used to set the color for HPLOT commands. The command must be followed by the color number, between 0 and 7, inclusive. This number determines the color as shown in **Tables 1** and **2**. An example is

```
30 HCOLOR = 3
```

Table 1 lists the color Apple claims in the *BASIC Programming Reference Manual*, while **Table 2** lists the actual colors displayed on an Apple IIGS RGB Monitor. Notice the effect of different monitors on the colors. Of course, monochrome monitors cannot display color, but they display a different pattern of dots for each color. In addition, when lines of different colors are close to each other, they seem to mix and cause strange effects. The reason for this phenomenon is based on Steve Wozniak's ingenious method of displaying color, and will be explained in depth later.

HPLOT: This command draws dots and lines on the screen in the current HCOLOR. If you simply enter HPLOT *X,Y*, the computer will draw a single dot on the screen at the location *X,Y*. If you enter HPLOT TO *X,Y* the computer will draw a line from the last dot plotted to the point *X,Y*. If you enter HPLOT *X1,Y1* TO *X2,Y2* TO *X3,Y3* TO *X4,Y4*... the computer will make a "dot to dot" drawing, starting at *X1,Y1*, and drawing a line to each successive points. This example plots a diagonal line and a triangle:

```
40 HPLOT 0,0
50 HPLOT TO 70,90
60 HPLOT 43,50 TO 95,100 TO 107,60 TO 43,50
```

In all cases, *X* must be between 0 and 279 inclusive, and *Y* must be between 0 and 191. If the split-screen mode is active (i.e. four lines of text are displayed, such as in HGR), Y positions greater than 159 are not visible. (They are hidden behind the text.)

Note in **Figure 1** that, unlike traditional graphs, the origin (0,0) is in the upper left corner.

GRAPHICS PAGES

The concept of graphics pages (already mentioned under HGR and HGR2) is important for programming the Apple. Within the computer's memory, four different areas are reserved for display of text and graphics. They are referred to as pages. Text page 1 is used for 40- and 80-column text, as well as low-resolution graphics. Text page 2 is almost never used. In fact, Applesoft stores program code there; text page 2 can be displayed only by activating certain soft-switches. For all practical purposes, we can ignore this page. Hi-Res page 1 is the one shown by HGR. Hi-Res page 2 appears identical, and is displayed by HGR2. In addition, some programmers talk about a Hi-Res page 3. Located just above the second Hi-Res page in memory, it cannot be displayed on the screen directly. However, it occasionally has use in animation and special effects.

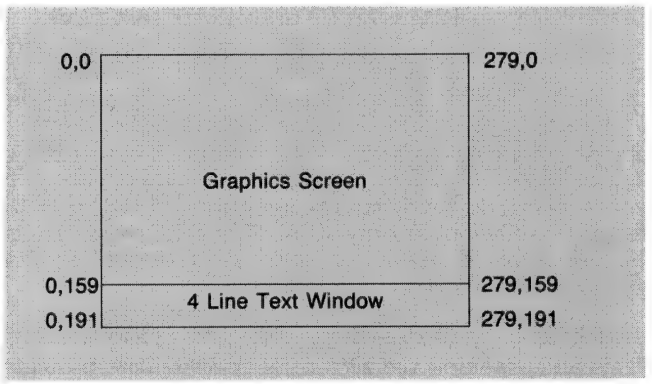


Figure 1: Hi-Res Page 1

Using the different Hi-Res pages, you can create flicker-free animation. The key is to draw an image on page one and display it. Then draw a slightly different image on page two and flip to display the second page. Redraw another slightly different picture on the first page, flip back to it, and so on. This technique is much like a cartoon drawn on many sheets of paper that are rapidly flipped. Each page is drawn while the user is watching the previous page.

SOFT-SWITCHES

How do we draw on different pages? The commands HGR and HGR2 cannot do this because they erase the page they display. Instead, we must turn to special memory locations in the Apple called soft-switches. These soft-switches determine what is displayed at the moment. The eight display switches common to all Apple IIs are listed below:

Address	Purpose
49232 (−16304)	Show Graphics Screen
49233 (−16303)	Show Text Screen
49234 (−16302)	Show Full Screen (if in Graphics)
49235 (−16301)	Show Split-Screen (if in Graphics)
49236 (−16300)	Show Text Page 1 or Graphics Page 1
49237 (−16299)	Show Text Page 2 or Graphics Page 2
49238 (−16298)	Show Lo-Res (if in Graphics)
49239 (−16297)	Show Hi-Res (if in Graphics)

The soft-switches are activated by POKEing their address with any number. For instance, to show the text screen, enter:

```
POKE 49233,0
```

or

```
POKE -16303,0
```

The two numbers 49233 and −16303 are considered equal by the computer. Also, you could have POKEd any number other than zero with the same effect; all that matters is the reference to the soft-switch.

Let's learn about these soft-switches by writing a brief program that displays Hi-Res page 1, but does not erase it the way HGR would.

```
10 POKE -16300,0 : REM SET PAGE NUMBER TO 1
20 POKE -16301,0 : REM ENABLE SPLIT SCREEN
30 POKE -16297,0 : REM ENABLE HI-RESOLUTION
40 POKE -16304,0 : REM FLIP FROM TEXT TO GRAPHICS
```

The order of setting the switches does not matter, but I usually like to conclude with −16304. This way, my program will instantly switch from text to graphics without any flicker. If you run this program before clearing the Hi-Res screen, the screen will be covered with random colors.

Don't worry; just type TEXT to revert to text mode.

Note that while in text mode or split-screen text and graphics mode it is possible to display page 2 by POKEing the soft-switch at 49237. This has an exotic effect: the visible text is garbage, and the commands HOME, PRINT, etc. do not appear to work. You are witnessing text page 2, which contains random data (probably the beginning of your Applesoft program). It is not affected by Applesoft instructions, and looks truly awful. Moral: When displaying Hi-Res graphics page 2, be sure to set the full screen graphics soft-switch at −16302.

One more memory location is important for page-flip animation. Applesoft has an internal variable at location 230. (This address is on the zero page at $E6. The "$" sign preceding a number indicates that the number is in base sixteen, or hexadecimal. Zero page addresses are those between 0 and 255. Applesoft uses many of them for storing its internal information.) This variable at $E6 determines the Hi-Res page upon which HPLOT will act. HGR and HGR2 automatically take care of setting the variable, but when you wish to draw on a different page while using the soft-switches, you must handle this variable yourself. In order to draw on Hi-Res page 1, enter POKE 230,32. Use POKE 230,64 for page 2. This switch also allows drawing to the invisible page 3 by writing POKE 230,96.

EXAMPLE PROGRAM

In summary, we have reviewed Applesoft's built-in drawing commands. We have learned about the different graphics pages and how to access them. And we have learned about using soft-switches to control the display directly.

Now we are ready to incorporate all of this knowledge into an simple animation program. Enter the program in **Listing 1** and save it to disk with the command

```
SAVE HPLOT.DEMO1
```

This program draws a ball, and, using page flipping for flicker-free animation, shows it bouncing across the screen. **Lines 110-130** clear the screen and draw in the ground. **Lines 140-160** read in the data for the ball's shape and initialize several variables.

The heart of the program is the animation routine, **lines 210-310.** The current drawing screen is set in **line 310**, so that the ball will be drawn on the screen not currently seen. Then the old ball is erased and a new ball is drawn. When it is completely drawn, the program flips to the new graphics page and reveals the ball in its new position. This process repeats on alternate screens, moving the ball just slightly each time, creating the illusion of motion.

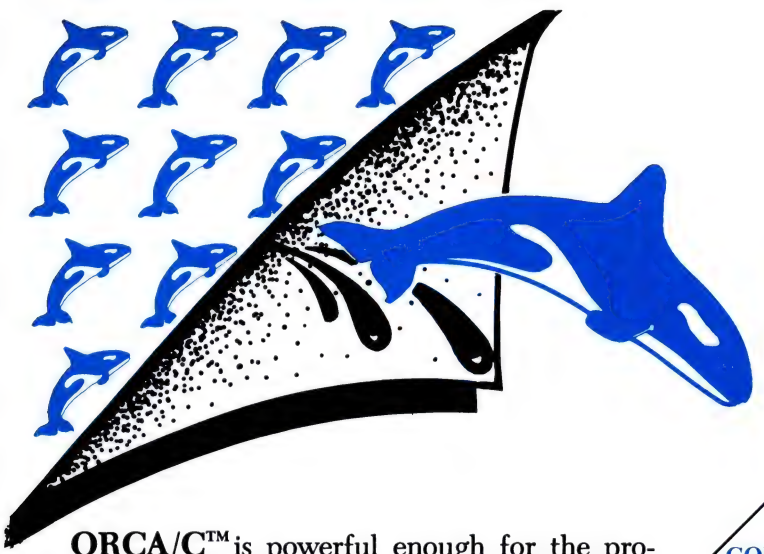
The motion is flicker-free, but rather slow because of the number of lines that must be drawn. In a future article, we will learn how to use block shapes to create animation that is far, far faster.

LISTING 1: HPLOT.DEMO1

```
37 | 10  REM  ***************************
C0 | 20  REM  * HPLOT.DEMO1               *
B9 | 30  REM  * BY DAVID HARRIS           *
AE | 40  REM  * COPYRIGHT(C) 1990         *
CB | 50  REM  * MINDCRAFT PUBL. CORP.     *
24 | 60  REM  * CONCORD, MA 01742         *
45 | 70  REM  ***************************
D3 | 80 :
4A | 90 : REM  ** INITIALIZE **
F2 | 100  PRINT  CHR$ (21)
A7 | 110  HCOLOR= 3
C4 | 120  HGR : HPLOT 0,176 TO 279,176
6E | 130  HGR2 : HPLOT 0,176 TO 279,176
97 | 140  FOR LOOP = 0 TO 5: READ WIDTH(LOOP): NEXT
   |      LOOP
A9 | 150 X = 50:Y = 50
76 | 160 SCREEN = 0
AB | 170 X1 = 10:Y1 = 10: REM  NULL VALUES
9A | 180 :
5B | 190 : REM  ** ANIMATE **
9F | 200 :
40 | 210  FOR T = 1 TO 104
BC | 220  POKE 230,32 * (SCREEN + 1)
80 | 230 X2 = X:Y2 = Y
C2 | 240 X = X1:Y = Y1: HCOLOR= 0: GOSUB 330
83 | 250 X1 = X2:Y1 = Y2
04 | 260  READ Y:Y = 170 - Y:X = T * 2 + 5
61 | 270  HCOLOR= 3: GOSUB 330
35 | 280  POKE  - 16300 + SCREEN,0
79 | 290 SCREEN = 1 - SCREEN
B5 | 300  NEXT T
6E | 310  WAIT  - 16384,128: TEXT : HOME : END
01 | 320 :
9F | 330 : REM  ** DRAW BALL **
9F | 340 :
20 | 350  FOR LOOP = 0 TO 5
07 | 360  HPLOT X - WIDTH(LOOP),Y - 5 + LOOP TO X +
   |      WIDTH(LOOP),Y - 5 + LOOP
BD | 370  HPLOT X - WIDTH(LOOP),Y + 5 - LOOP TO X +
   |      WIDTH(LOOP),Y + 5 - LOOP
0C | 380  HPLOT X,Y
FE | 390  NEXT LOOP
BB | 400  RETURN
15 | 410  DATA  1,3,4,4,5,5
05 | 420 :
12 | 430 : REM  ** PATH DATA **
A7 | 440 :
F2 | 450  DATA  150,147,145,142,140,135,130,125,120,
   |      112,105,97,90,80,70,60,50,37,25,12,0
82 | 460  DATA  10,20,30,40,47,55,62,70,75,80,85,90,
   |      92,95,97,100,97,95,92,90,85,80,75,70,62,55,
   |      47,40,30,20,10,0
0A | 470  DATA  7,15,22,30,35,40,45,50,52,55,57,60,5
   |      7,55,52,50,45,40,35,30,22,15,7,0
22 | 480  DATA  5,10,15,20,22,25,27,30,27,25,22,20,1
   |      5,10,5,0
3C | 490  DATA  2,5,7,10,7,5,2,0
21 | 500  DATA  0,0,0

TOTAL: E91F

END OF LISTING 1
```



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by Brent Iverson

SMART COLOR FILL

Hang new shades on any shape

Smart Color Fill is a short machine-language program that will fill almost any black area with the colors designated by the Applesoft HCOLOR command (1, 2, 3, 5, 6, or 7).

Last spring, I needed a fill routine to accompany a graphics program on which I was working. The routine had to fill complex areas, meaning I couldn't just use one of the commercial fill routines available. (The majority of these are geared for speed, and the ability to fill complex areas would slow them down unacceptably.)

So, I had to write my own fill routine. The first thing I needed was an algorithm for complete filling. Computer graphics journals have published numerous articles about filling algorithms, so I checked through the ones at a university library. No luck. Most of the algorithms were described in a very hazy pseudocode, or were written in a computer language that hasn't been used in 15 years or so. The rest of the algorithms were impractical for anything less than a mainframe. So I had to come up with my own algorithm.

Brent Iverson, Select Software, 9538 Pondwood Road, Boca Raton, FL 33433. *This program is compatible with DOS 3.3 and ProDOS.*

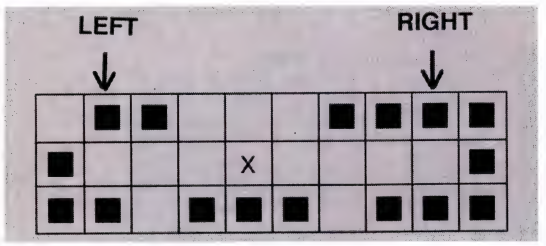

Figure 1: X marks the starting point

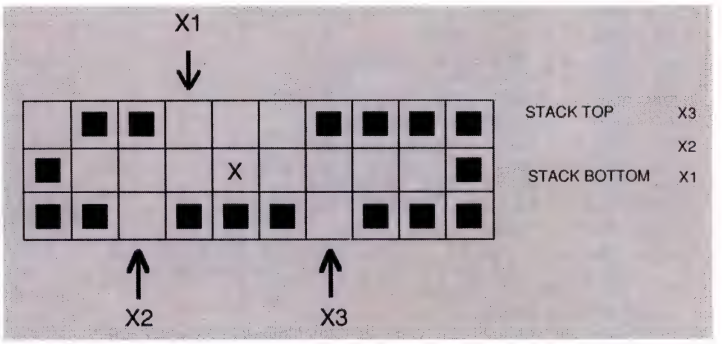

Figure 2: The stack

USING THE PROGRAM

To use FILL.DEMO (**Listing 1**), just run the program and watch the Hi-Res screen. It will plot a few patterns on the screen, make calls to the filling routine, make a short buzzing sound, and end. The filling part of the program takes 20 seconds.

FILL.BIN will fill a black area enclosed by most non-black boundaries. The fill color must be between 1 and 7. To use this routine from Applesoft, you must first initialize certain memory locations in the following manner:

```
POKE 6,X-(X-255)*256
POKE 7,X-255
POKE 8,Y
POKE 9,C
```

X and Y represent the screen coordinates at which the filling will start, and C is the fill color (1-7). Once you've done this, call the routine with

```
CALL 16384
```

ENTERING THE PROGRAM

To enter the routine, you can type the source code from **Listing 2** into the Editor Assembler (if you have it), and save the object code as FILL.BIN. Or you can type in the hex codes from **Listing 3**. First enter the Monitor with

```
CALL -151
```

Save the file with the command

```
BSAVE FILL.BIN,A$4000,L$30D
```

To enter the demonstration program, type in **Listing 1** and save it with

```
SAVE FILL.DEMO
```

For more help with *Nibble* listings, see the Typing Tips section in this issue.

HOW THE PROGRAM WORKS

FILL.BIN uses an algorithm that works this way:

1. It searches to the left from the starting point until it reaches a colored dot. It stores the position of the dot to the right of this one as *Left*. Then, it searches to the right from the starting point until it finds a colored dot. It stores the position of the dot to the left of this one as *Right*. (See **Figure 1**. The X is the starting point of the fill. The dots are colored pixels. The other pixels are black, or uncolored.)
2. From left to right, it searches one row above the starting point for the dots in uncolored spaces that are farthest to the left. In this case, the only one is at X1. It pushes this position onto the stack.
3. It searches from left to right, one row below the starting point, for dots as described in step two. In this case, it will find X2 and X3, and it pushes them onto the stack. **Figure 2** shows the state of the stack, as well as the points we've found so far, after step three has been carried out.
4. The algorithm picks a new starting point from the top of the stack (in this case, X3), and starts over at step one.

Because of the way color is obtained on the Apple, this program will not fill areas of two dots or less, and frequently will miss areas of three dots. If the program were able to fill in these areas, it would also fill between the alternately spaced dots of nonwhite lines.

This program is not as fast as the filling routines used in Hi-Res adventures, because those don't have to check above and below every dot in a row, as this program does. Filling the entire screen takes about 17 seconds.

The routine will fill any area with any Hi-Res color unless the area is exceedingly complex.

MODIFICATIONS

FILL.BIN will fill any area unless the area is exceedingly complex (and the program runs out of stack space). If this happens, the program will end with the area only partially filled. If you want to increase the stack space available to the program (to allow it to fill very complex areas), just increase the value of LIM in the source listing.

The program is assembled just above the first Hi-Res page. If you want to assemble it at a different location, just remember to change the address of STBASE (the location of the first byte of storage for the stack used by the program).

The stack uses (3 * LIM) bytes, starting at STBASE.

LISTING 1: FILL.DEMO

```
37 | 10  REM   ****************************
C0 | 20  REM   * FILL.DEMO                 *
B9 | 30  REM   * BY BRENT IVERSON          *
AE | 40  REM   * COPYRIGHT(C) 1990         *
CB | 50  REM   * MINDCRAFT PUBL. CORP.     *
24 | 60  REM   * CONCORD, MA. 01742        *
45 | 70  REM   ****************************
61 | 80  PRINT  CHR$ (4)"BLOAD FILL.BIN"
41 | 90  REM ---SET UP FOR GRAPHICS
56 | 100  HGR : POKE  - 16302,0: HCOLOR= 3
D7 | 110  REM ---DRAW "F"
09 | 120  HPLOT 30,30 TO 70,30 TO 70,50 TO 40,50 TO
       40,90 TO 60,90 TO 60,110 TO 40,110 TO 40,15
       0 TO 30,150 TO 30,30
25 | 130  REM ---DRAW "I"
88 | 140  HPLOT 80,30 TO 130,30 TO 130,50 TO 110,50
       TO 110,130 TO 130,130 TO 130,150 TO 80,150
       TO 80,130 TO 100,130 TO 100,50 TO 80,50 TO
        80,30
F3 | 150  REM ---DRAW "L"
67 | 160  HPLOT 150,30 TO 160,30 TO 160,130 TO 190,1
       30 TO 190,150 TO 150,150 TO 150,30
29 | 170  REM ---DRAW "L"
0F | 180  HPLOT 210,30 TO 220,30 TO 220,130 TO 250,1
       30 TO 250,150 TO 210,150 TO 210,30
1D | 190  REM ---MAKE BORDER LINES
F9 | 200  FOR I = 0 TO 24 STEP 6: HPLOT I,I TO 279 -
       I,I TO 279 - I,191 - I TO I,191 - I TO I,I
       : NEXT
A4 | 210  REM ---FILL IN AREAS
F3 | 220 X = 2:Y = 2:C = 1: GOSUB 350
5C | 230 X = 8:Y = 8:C = 2: GOSUB 350
9B | 240 X = 14:Y = 14:C = 1: GOSUB 350
61 | 250 X = 20:Y = 20:C = 2: GOSUB 350
14 | 260 X = 26:Y = 25:C = 3: GOSUB 350
DE | 270 X = 35:Y = 35:C = 5: GOSUB 350
96 | 280 X = 85:Y = 35:C = 6: GOSUB 350
E5 | 290 X = 155:Y = 35:C = 5: GOSUB 350
44 | 300 X = 215:Y = 35:C = 6: GOSUB 350
AA | 310  REM ---MAKE BUZZ AND END
DE | 320  FOR I = 1 TO 100:P =  PEEK ( - 16336): NEX
       T
EE | 330  END
55 | 340  REM ---CALL FILL ROUTINE
0A | 350  POKE 6,X - (X > 255) * 256
0A | 360  POKE 7,X > 255
2B | 370  POKE 8,Y
47 | 380  POKE 9,C
B2 | 390  CALL 16384
BB | 400  RETURN

TOTAL: 3BFA
```

END OF LISTING 1

LISTING 2: FILL.BIN Source Code

```
 1 ********************************
 2 * FILL.BIN SOURCE CODE         *
 3 * BY BRENT IVERSON             *
 4 * COPYRIGHT(C) 1990            *
 5 * MINDCRAFT PUBL. CORP.        *
 6 * CONCORD, MA 01742            *
 7 * EDITOR ASSEMBLER             *
 8 ********************************
 9 *
10           ORG   16384
11           JMP   BEGIN
12 *
13 * ONE-BYTE VARIABLES
14 *
15 DEPTH      DS    1
16 COLOR      DS    1
17 XBYTE      DS    1
18 OXBYTE     DS    1
19 XBIT       DS    1
20 OXBIT      DS    1
21 YC         DS    1
22 XLBIT      DS    1
23 XLBYTE     DS    1
24 XRBIT      DS    1
25 XRBYTE     DS    1
26 F          DS    1
27 M0         DS    1
28 M1         DS    1
29 M2         DS    1
30 M3         DS    1
31 D0         DS    1
32 D1         DS    1
33 D2         DS    1
34 CODE       DS    1
35 *
36 * LOCATIONS OF PARAMETERS
37 * GIVEN TO THIS ROUTINE
38 *
39 XL         EQU   6
40 XH         EQU   7
41 YB         EQU   8
42 CO         EQU   9
43 *
44 * BITMASKS USED TO
45 * DETECT OPEN AREAS
46 *
47 BITMASK    DFB   1,2,4,8
48           DFB   16,32,64
49 FBITMASK   DFB   3,7,14,28
50           DFB   56,112,96
51 *
52 * LOCATION OF LINE-BASE
53 * DATA FROM HBAS ROUTINE
54 *
55 ONE        EQU   $26
56 *
57 * MAXIMUM NUMBER OF
58 * BYTES IN EACH STACK
59 *
60 LIM        EQU   100
61 *
62 * STACK LOCATIONS
63 *
64 STBASE     EQU   18000
65 STACKXBYTE EQU  STBASE
66 STACKXBIT EQU   STBASE+LIM
67 STACKYC    EQU   STBASE+LIM+LIM
68 *
69 * APPLESOFT HI-RES ROUTINES
70 *
71 HPOSN      EQU   $F411
72 HLIN       EQU   $F53A
73 HPLOT      EQU   $F457
74 HCOLOR     EQU   $F6F0
75 *
76 *---------------------
77 *
78 * INITIALIZE STACK
79 *
80 BEGIN      LDA   #0
81           STA   DEPTH
82 *
83 * GET X-BIT,X-BYTE,
84 * AND Y-COORDINATE
85 *
86           JSR   DIVIDE
87           LDA   D2
88           STA   XBIT
89           LDA   D1
90           STA   XBYTE
91           LDA   YB
92           STA   YC
93 *
94 * GET COLOR. CHECK
95 * THAT IT IS <8 AND
96 * NON-BLACK
97 *
98           LDX   CO
99           BEQ   RET
100          CPX   #8
101          BCS   RET
102          CPX   #4
103          BNE   COL
104 RET      RTS
105 *
106 * DESIRED COLOR IS
107 * LEGAL, SO CHANGE
108 * HCOLOR TO THAT
109 *
110 COL      STX   COLOR
111          JSR   HCOLOR
112 *
113 * SAVE CURRENT XBIT
114 * AND XBYTE
115 *
116 MAIN     LDA   XBYTE
117          STA   OXBYTE
118          LDA   XBIT
119          STA   OXBIT
120 *
121 * FIND LEFTMOST BYTE
122 * OF THIS ROW
123 *
124          LDX   #0
125          LDY   #0
126          LDA   YC
127          JSR   HPOSN
128 *
129 * CHECK IF THIS LOCATION
130 * IS COLORED.  IF IT IS,
131 * THEN SKIP THE WHOLE
132 * CHECKING & COLORING ROUTINE
133 * AND GO GET THE NEXT
134 * LOCATIONS FROM THE STACK
135 *
136          LDY   XBYTE
137          LDX   XBIT
138          JSR   VERIFY
139          BEQ   LOOPLEFT
140          JMP   END
141 *
142 * IF CURRENT LOCATION IS
143 * COLORED, STOP ADVANCING
144 * TO THE LEFT
145 *
146 STARTLEFT BNE   GOTLEFT
147 *
148 * DECREMENT THE X-BIT. IF
149 * NECESSARY, DECREMENT THE
150 * X-BYTE.
151 *
152 LOOPLEFT  DEC   XBIT
153          LDA   XBIT
154          CMP   #255
155          BNE   CONTLEFT
156          LDA   #6
157          STA   XBIT
158          DEC   XBYTE
159 *
160 * IF WE HAVE GONE OFF
161 * THE LEFT SIDE OF THE
162 * SCREEN, JUMP OUT OF
163 * THIS LOOP
164 *
165          LDA   XBYTE
166          CMP   #255
167          BEQ   GOTLEFT
168 *
169 * CHECK WHETHER THE CURRENT
170 * LOCATION IS COLORED
171 *
172 CONTLEFT  LDY   XBYTE
173          LDX   XBIT
174          JSR   VERIFY
175          JMP   STARTLEFT
176 *
177 * WE HAVE FOUND THE FIRST
178 * COLORED LOCATION TO THE
179 * LEFT OF THE STARTING
180 * POINT, SO INCREMENT
181 * THIS LOCATION TO GET THE
182 * LEFTMOST UNCOLORED SPOT
183 *
184 GOTLEFT   INC   XBIT
185          LDA   XBIT
186          CMP   #7
187          BCC   ENDLEFT
188          INC   XBYTE
189          LDA   #0
190          STA   XBIT
191 *
192 * SAVE THIS UNCOLORED
193 * SPOT
194 *
195 ENDLEFT  LDA   XBIT
196          STA   XLBIT
197          LDA   XBYTE
198          STA   XLBYTE
199 *
200 * START CHECKING TO THE
201 * RIGHT OF THE ORIGINAL
202 * STARTING POINT FOR THIS
203 * ROW
204 *
205          LDA   OXBYTE
206          STA   XBYTE
207          TAY
208          LDA   OXBIT
```

```
209             STA   XBIT
210             TAX
211             JSR   VERIFY
212 *
213 * IF CURRENT LOCATION IS
214 * COLORED, STOP ADVANCING
215 * TO THE RIGHT
216 *
217 STARTRIGHT BNE  GOTRIGHT
218 *
219 * INCREMENT THE X-BIT.
220 * IF NECESSARY, INCREMENT
221 * THE X-BYTE
222 *
223 LOOPRIGHT INC   XBIT
224             LDA   XBIT
225             CMP   #7
226             BCC   CONTRIGHT
227             LDA   #0
228             STA   XBIT
229             INC   XBYTE
230 *
231 * IF WE HAVE GONE OFF
232 * THE RIGHT SIDE OF THE
233 * SCREEN, STOP ADVANCING
234 * TO THE RIGHT
235 *
236             LDA   XBYTE
237             CMP   #40
238             BEQ   GOTRIGHT
239 *
240 * CHECK IF THE CURRENT
241 * LOCATION IS COLORED
242 *
243 CONTRIGHT LDY   XBYTE
244             LDX   XBIT
245             JSR   VERIFY
246             JMP   STARTRIGHT
247 *
248 * WE HAVE FOUND THE FIRST
249 * COLORED LOCATION TO THE
250 * RIGHT OF OUR STARTING
251 * POINT, SO DECREMENT THIS
252 * LOCATION TO FIND THE LAST
253 * UNCOLORED LOCATION TO THE
254 * RIGHT OF THE STARTING POINT.
255 *
256 GOTRIGHT  DEC   XBIT
257             LDA   XBIT
258             CMP   #255
259             BNE   ENDRIGHT
260             LDA   #6
261             STA   XBIT
262             DEC   XBYTE
263 *
264 * STORE THIS UNCOLORED
265 * SPOT
266 *
267 ENDRIGHT  LDA   XBIT
268             STA   XRBIT
269             LDA   XBYTE
270             STA   XRBYTE
271 *
272 * DRAW A LINE BETWEEN
273 * THESE TWO UNCOLORED
274 * LOCATIONS
275 *
276             JSR   PLOT
277 *
278 * IF WE ARE AT THE TOP
279 * OF THE SCREEN, DON'T
280 * CHECK ABOVE THIS ROW
281 *
282             LDA   YC
283             BEQ   STARTB
284 *
285 * SET THE "COLORED"
286 * FLAG
287 *
288             LDA   #0
289             STA   F
290 *
291 * CHECK ABOVE THIS ROW,
292 * BETWEEN OUR TWO ENDPOINTS,
293 * FOR POSSIBLE LOCATIONS
294 * TO ADD TO THE STACK
295 *
296             LDA   XLBIT
297             STA   XBIT
298             LDA   XLBYTE
299             STA   XBYTE
300 *
301 * FIND THE LEFTMOST
302 * BYTE OF THE ROW ABOVE
303 * OUR STARTING ROW
304 *
305             LDX   #0
306             LDY   #0
307             LDA   YC
308             SEC
309             SBC   #1
310             JSR   HPOSN
311 *
312 * CHECK IF LOCATION
313 * IS COLORED
314 *
315 LKABOVE   LDY   XBYTE
316             LDX   XBIT
317             JSR   FVERIFY
318             BNE   ACOL
319 *
320 * LOCATION IS UNCOLORED.
321 * IF THE "COLORED" FLAG
322 * IS SET, CLEAR IT AND ADD
323 * THIS LOCATION TO THE STACK
324 *
325             LDA   F
326             BNE   INCA
327             DEC   YC
328             JSR   PUSH
329             INC   YC
330             LDA   #1
331             STA   F
332             JMP   INCA
333 *
334 * LOCATION IS COLORED.
335 * SET "COLORED" FLAG.
336 *
337 ACOL      LDA   #0
338             STA   F
339 *
340 * INCREMENT THE XBIT.
341 * IF NECESSARY, INCREMENT
342 * THE XBYTE
343 *
344 INCA      INC   XBIT
345             LDA   XBIT
346             CMP   #7
347             BCC   ENDA
348             LDA   #0
349             STA   XBIT
350             INC   XBYTE
351 *
352 * IF WE HAVE GONE PAST
353 * THE RIGHT LIMIT, END
354 * THIS LOOP.
355 *
356 ENDA      LDA   XBYTE
357             CMP   XRBYTE
358             BCC   LKABOVE
359             BNE   STARTB
360             LDA   XBIT
361             CMP   XRBIT
362             BCC   LKABOVE
363             BEQ   LKABOVE
364 *
365 * SET THE "COLORED" FLAG
366 *
367 STARTB    LDA   #0
368             STA   F
369 *
370 * IF WE ARE AT THE BOTTOM
371 * OF THE SCREEN, DON'T
372 * CHECK BELOW THIS ROW
373 *
374             LDA   YC
375             CMP   #191
376             BCS   END
377 *
378 * CHECK THE ROW BELOW OUR
379 * STARTING ONE, BETWEEN THE
380 * TWO HORIZONTAL ENDPOINTS, FOR
381 * LOCATIONS TO ADD TO THE
382 * STACK.
383 *
384             LDA   XLBIT
385             STA   XBIT
386             LDA   XLBYTE
387             STA   XBYTE
388 *
389 * FIND THE LEFTMOST BYTE
390 * OF THIS ROW
391 *
392             LDX   #0
393             LDY   #0
394             LDA   YC
395             CLC
396             ADC   #1
397             JSR   HPOSN
398 *
399 * CHECK IF THE CURRENT
400 * LOCATION IS COLORED
401 *
402 LKBELOW   LDY   XBYTE
403             LDX   XBIT
404             JSR   FVERIFY
405             BNE   BCOL
406 *
407 * THE CURRENT LOCATION IS
408 * UNCOLORED.  IF THE "COLORED"
409 * FLAG IS SET, CLEAR IT AND
410 * ADD THIS LOCATION TO THE
411 * STACK.
412 *
413             LDA   F
414             BNE   INCB
415             INC   YC
416             JSR   PUSH
417             DEC   YC
418             LDA   #1
419             STA   F
420             JMP   INCB
421 *
422 * THE CURRENT LOCATION IS
423 * COLORED, SO SET THE
424 * "COLORED" FLAG
425 *
426 BCOL      LDA   #0
427             STA   F
428 *
429 * INCREMENT THE XBIT.  IF
430 * NECESSARY, INCREMENT THE
431 * XBYTE.
432 *
433 INCB      INC   XBIT
434             LDA   XBIT
435             CMP   #7
436             BCC   ENDB
437             LDA   #0
438             STA   XBIT
439             INC   XBYTE
440 *
441 * IF WE ARE PAST OUR
442 * RIGHT HORIZONTAL LIMIT,
443 * E6D THIS LOOP
444 *
445 ENDB      LDA   XBYTE
446             CMP   XRBYTE
447             BCC   LKBELOW
448             BNE   END
449             LDA   XBIT
450             CMP   XRBIT
451             BCC   LKBELOW
452             BEQ   LKBELOW
453 *
454 * POP ANOTHER LOCATION
455 * FROM THE STACK AND
456 * START MAIN LOOP AGAIN
457 *
458 END       JSR   POP
459             JMP   MAIN
460 *
461 *--------------------
462 *
463 * SUBROUTINE TO PUSH
464 * LOCATION DATA ONTO
465 * THE STACK.
466 *
467 * IF THE STACK IS ALREADY
468 * FULL, THEN RETURN WITHOUT
469 * PUSHING
470 *
471 PUSH      LDA   DEPTH
472             CMP   #LIM
473             BCS   PUSH2
474 *
475 * INCREMENT THE DEPTH
476 * COUNTER
477 *
478             INC   DEPTH
479 *
480 * PUSH THE DATA ONTO
481 * THE APPROPRIATE STACK
482 *
483             LDX   DEPTH
484             LDA   XBYTE
485             STA   STACKXBYTE,X
486             LDA   XBIT
487             STA   STACKXBIT,X
488             LDA   YC
489             STA   STACKYC,X
490 PUSH2     RTS
491 *
492 *--------------------
493 *
494 * SUBROUTINE TO POP
495 * LOCATION DATA FROM
496 * THE STACK
497 *
498 * IF THE STACK IS EMPTY,
499 * THEN TAKE THE LAST RETURN
500 * ADDRESS FROM THE STACK
501 * AND EXECUTE AN "RTS" TO
502 * RETURN TO WHATEVER CALLED
503 * THIS WHOLE PROGRAM
504 *
505 POP       LDA   DEPTH
506             BNE   POP2
507             PLA
508             PLA
509             RTS
510 *
511 * POP THE LOCATION DATA
512 * FROM ITS APPROPRIATE STACK
513 *
514 POP2      LDX   DEPTH
515             LDA   STACKXBYTE,X
516             STA   XBYTE
517             LDA   STACKXBIT,X
518             STA   XBIT
519             LDA   STACKYC,X
520             STA   YC
521 *
522 * DECREMENT THE DEPTH
523 * COUNTER
524 *
525             DEC   DEPTH
526             RTS
527 *
528 *--------------------
529 *
530 * VERIFY ROUTINE USED
531 * WHEN CHECKING LEFT AND
532 * RIGHT FOR COLORED DOTS
533 * IN A ROW
534 *
535 * GET THE BYTE TO BE
536 * CHECKED AND STORE IT
537 *
538 VERIFY    LDA   (ONE),Y
539             STA   CODE
540 *
541 * "AND" IT WITH THE
542 * PROPER BITMASK TO
543 * CHECK FOR THE BIT
544 * IN QUESTION
545 *
546             LDA   BITMASK,X
547             AND   CODE
```

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LISTING 2: FILL.BIN Source Code
continued

```
            RTS
*
*--------------------
*
* VERIFY ROUTINE USED
* WHEN CHECKING FOR LOCATIONS
* TO ADD TO THE STACK
*
* GET THE CURRENT BYTE
*
FVERIFY     LDA   (ONE),Y
            STA   CODE
*
* IF WE ARE CHECKING
* BITS 0 OR 6, DO SPECIAL
* ROUTINES FOR THESE
* CASES
*
            CPX   #6
            BEQ   FVERIFY6
            CPX   #0
            BEQ   FVERIFY0
*
* "NORMAL" CASE.  CHECK
* THREE ADJACENT BITS IN
* THE CURRENT BYTE
*
            LDA   FBITMASK,X
            AND   CODE
            RTS
*
* "SIXTH BIT" CASE.
* GET THE TWO RIGHTMOST
* VISIBLE BITS IN THE
* CURRENT BYTE
*
FVERIFY6    LDA   FBITMASK,X
            AND   CODE
            STA   D0
*
* GET THE LEFTMOST BIT
* IN THE BYTE TO THE RIGHT
* OF THIS ONE
*
            INY
            LDA   (ONE),Y
            AND   #1
*
* "OR" THE TWO RESULTS
* TOGETHER
*
            ORA   D0
            RTS
*
* "ZEROTH BIT" CASE
* GET THE LEFTMOST TWO
* BITS IN THE CURRENT BYTE
*
FVERIFY0    LDA   FBITMASK,X
            AND   CODE
            STA   D0
*
* GET THE RIGHTMOST VISIBLE
* BIT IN THE BYTE TO THE LEFT
* OF THIS ONE
*
            DEY
            LDA   (ONE),Y
            AND   #64
*
* "OR" THESE TOGETHER FOR
* THE FINAL RESULT
*
            ORA   D0
            RTS
*
*--------------------
*
* SUBROUTINE TO PLOT A
* LINE BETWEEN TWO POINTS
* SPECIFIED BY BITS AND
* BYTES, ON THE SAME ROW
*
* MULTIPLY THE LEFT BYTE
* BY 7 AND ADD THE LEFT
* BIT TO GET THE LEFT
* HORIZONTAL COORDINATE
*
PLOT        LDA   XLBYTE
            STA   M2
            LDA   #7
            STA   M3
            JSR   MULTIPLY
            LDA   M1
            CLC
            ADC   XLBIT
            TAX
            BCC   PLOT2
            INC   M0
PLOT2       LDY   M0
            LDA   YC
*
* PLOT THE LEFT COORDINATE
*
            JSR   HPLOT
*
* MULTIPLY THE RIGHT BYTE
* BY 7 AND ADD THE RIGHT BIT
* TO GET THE RIGHT HORIZONTAL
* COORDINATE
*
            LDA   XRBYTE
            STA   M2
            LDA   #7
            STA   M3
            JSR   MULTIPLY
            LDA   M1
            CLC
            ADC   XRBIT
            BCC   PLOT3
            INC   M0
PLOT3       LDX   M0
            LDY   YC
*
* DRAW A LINE BETWEEN THE
* LEFT AND RIGHT COORDINATES
*
            JSR   HLIN
            RTS
*
*--------------------
*
* SUBROUTINE TO MULTIPLY
* TWO 8-BIT NUMBERS TOGETHER
* WITH A 16-BIT RESULT
*
MULTIPLY    LDA   #0
            STA   M0
            STA   M1
            LDX   #8
MULT1       ASL   A
            ROL   M0
            ASL   M3
            BCC   MULT2
            CLC
            ADC   M2
            BCC   MULT2
            INC   M0
MULT2       DEX
            BNE   MULT1
            STA   M1
            RTS
*
*--------------------
*
* SUBROUTINE TO DIVIDE
* A 16-BIT NUMBER BY 7,
* GIVING AN 8-BIT RESULT
* AND A REMAINDER
*
DIVIDE      LDX   #8
            LDA   #7
            STA   D0
            LDA   XL
            STA   D1
            LDA   XH
DIV         ASL   D1
            ROL   A
            CMP   D0
            BCC   DIV2
            SBC   D0
            INC   D1
DIV2        DEX
            BNE   DIV
            STA   D2
            RTS
```

END OF LISTING 2

LISTING 3: FILL.BIN

Start: 4000 Length: 30D

```
81 4000:4C 25 40 A0 A0 F5 D4 B0
2F 4008:F5 A0 E1 A0 B4 C4 A0 87
5F 4010:A0 A0 A0 B7 8A CC C5 01
40 4018:02 04 08 10 20 40 03 07
BC 4020:0E 1C 38 70 60 A9 00 8D
E2 4028:03 40 20 E9 42 AD 15 40
D2 4030:8D 07 40 AD 14 40 8D 05
31 4038:40 A5 08 8D 09 40 A6 09
73 4040:F0 08 E0 08 B0 04 E0 04
38 4048:D0 01 60 8E 04 40 20 F0
11 4050:F6 AD 05 40 8D 06 40 AD
A7 4058:07 40 8D 08 40 A2 00 A0
F8 4060:00 AD 09 40 20 11 F4 AC
C7 4068:05 40 AE 07 40 20 3A 42
FF 4070:F0 05 4C F3 41 D0 25 CE
8D 4078:07 40 AD 07 40 C9 FF D0
82 4080:0F A9 06 8D 07 40 CE 05
15 4088:40 AD 05 40 C9 FF F0 0C
6D 4090:AC 05 40 AE 07 40 20 3A
ED 4098:42 4C 75 40 EE 07 40 AD
29 40A0:07 40 C9 07 90 08 EE 05
C8 40A8:40 A9 00 8D 07 40 AD 07
2D 40B0:40 8D 0A 40 AD 05 40 8D
10 40B8:0B 40 AD 06 40 8D 05 40
20 40C0:A8 AD 08 40 8D 07 40 AA
DC 40C8:20 3A 42 D0 25 EE 07 40
```

```
56 40D0:AD 07 40 C9 07 90 0F A9
8F 40D8:00 8D 07 40 EE 05 40 AD
8C 40E0:05 40 C9 28 F0 0C AC 05
09 40E8:40 AE 07 40 20 3A 42 4C
3A 40F0:CB 40 CE 07 40 AD 07 40
54 40F8:C9 FF D0 08 A9 06 8D 07
16 4100:40 CE 05 40 AD 07 40 8D
8F 4108:0C 40 AD 05 40 8D 0D 40
B0 4110:20 7E 42 AD 09 40 F0 6A
50 4118:A9 00 8D 0E 40 AD 0A 40
EC 4120:8D 07 40 AD 0B 40 8D 05
23 4128:40 A2 00 A0 00 AD 09 40
37 4130:38 E9 01 20 11 F4 AC 05
27 4138:40 AE 07 40 20 46 42 D0
28 4140:16 AD 0E 40 D0 16 CE 09
05 4148:40 20 F9 41 EE 09 40 A9
62 4150:01 8D 0E 40 4C 5C 41 A9
09 4158:00 8D 0E 40 EE 07 40 AD
7D 4160:07 40 C9 07 90 08 A9 00
25 4168:8D 07 40 EE 05 40 AD 05
BC 4170:40 CD 0D 40 90 C0 D0 0A
9A 4178:AD 07 40 CD 0C 40 90 B6
CF 4180:F0 B4 A9 00 8D 0E 40 AD
FA 4188:09 40 C9 BF B0 65 AD 0A
F3 4190:40 8D 07 40 AD 0B 40 8D
57 4198:05 40 A2 00 A0 00 AD 09
A3 41A0:40 18 69 01 20 11 F4 AC
AF 41A8:05 40 AE 07 40 20 46 42
20 41B0:D0 16 AD 0E 40 D0 16 EE
51 41B8:09 40 20 F9 41 CE 09 40
4A 41C0:A9 01 8D 0E 40 4C CD 41
10 41C8:A9 00 8D 0E 40 EE 07 40
16 41D0:AD 07 40 C9 07 90 08 A9
20 41D8:00 8D 07 40 EE 05 40 AD
59 41E0:05 40 CD 0D 40 90 C0 D0
47 41E8:0A AD 07 40 CD 0C 40 90
BB 41F0:B6 F0 B4 20 19 42 4C 51
FF 41F8:40 AD 03 40 C9 64 B0 18
61 4200:EE 03 40 AE 03 40 AD 05
66 4208:40 9D 50 46 AD 07 40 9D
7D 4210:B4 46 AD 09 40 9D 18 47
4E 4218:60 AD 03 40 D0 03 68 68
51 4220:60 AE 03 40 BD 50 46 8D
4F 4228:05 40 BD B4 46 8D 07 40
40 4230:BD 18 47 8D 09 40 CE 03
B2 4238:40 60 B1 26 8D 16 40 BD
07 4240:17 40 2D 16 40 60 B1 26
48 4248:8D 16 40 E0 06 F0 0B E0
7A 4250:00 F0 19 BD 1E 40 2D 16
D2 4258:40 60 BD 1E 40 2D 16 40
96 4260:8D 13 40 C8 B1 26 29 01
1F 4268:0D 13 40 60 BD 1E 40 2D
7A 4270:16 40 8D 13 40 88 B1 26
17 4278:29 40 0D 13 40 60 AD 0B
52 4280:40 8D 11 40 A9 07 8D 12
BA 4288:40 20 C6 42 AD 10 40 18
B2 4290:6D 0A 40 AA 90 03 EE 0F
9B 4298:40 AC 0F 40 AD 09 40 20
49 42A0:57 F4 AD 0D 40 8D 11 40
97 42A8:A9 07 8D 12 40 20 C6 42
89 42B0:AD 10 40 18 6D 0C 40 90
3E 42B8:03 EE 0F 40 AE 0F 40 AC
D8 42C0:09 40 20 3A F5 60 A9 00
24 42C8:8D 0F 40 8D 10 40 A2 08
6C 42D0:0A 2E 0F 40 0E 12 40 90
3F 42D8:09 18 6D 11 40 90 03 EE
C8 42E0:0F 40 CA D0 EB 8D 10 40
D2 42E8:60 A2 08 A9 07 8D 13 40
72 42F0:A5 06 8D 14 40 A5 07 0E
04 42F8:14 40 2A CD 13 40 90 06
56 4300:ED 13 40 EE 14 40 CA D0
91 4308:EE 8D 15 40 60

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END OF LISTING 3

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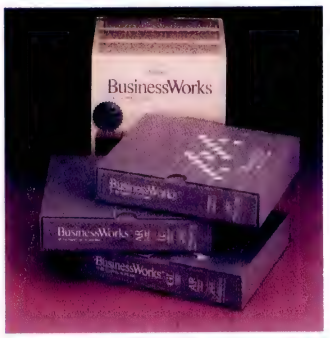

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Laser 128 Cables *(Parallel, Serial, RGB or Modem)*. 16.
Laser 128 Mouse. . . . . 45.
Laser 128 Disk Drive or Laser Amber Monitor. . . . 99.
Laser 128 800K 3.5" Drive w/ Controller. . . . . 215.
Laser 190A Printer w/ Serial Interface. . . . . 239.
Laser RGB Monitor. . . . . 315.
Laser 128 Computer. . . . . 385.
Laser 128EX Computer. . . . . 439.
Laser 128EX II Computer (5¼). . . . . 459.
Laser 128EX II Computer (3½). . . . . 509.

Backup Utilities

Apple
GS/OS v5 (GS). . . . . 45.
Central Point
Copy II Plus v9.0. . . . . 25.
Glen Bredon
Dos.Master or Pro.Cmd. . . . . 25.
ProSel 8 (5¼). . . . . 39.
ProSel 16 (3½). . . . . 59.
Vitesse, Inc.
Exorcizer(GS). . . . . 29.
Salvation:Guardian(GS) or Renaissance(GS). . . . . 35.
Genesis(GS). . . . . 59.

Entertainment Software

Accolade
European Roadways(GS) or Muscle Cars(GS). . . . . 15.
California Challenge Disk(GS) or Supercars(GS). . . . 15.
International Course Disk(GS). . . . . 15.
Bubble Ghost(GS). . . . . 24.
Serve & Volley(GS) or Test Drive. . . . . 27.
Mean 18(GS) or Hardball(GS). . . . . 29.
4th & Inches(GS). . . . . 29.
Heatwave(GS), FastBreak(GS) or Grand Prix Circuit(GS). . . . . 29.
Jack Nicklaus Golf(GS) or Blue Angels(GS). . . . . 34.
Third Courier(GS) or Test Drive II(GS). . . . . 34.
Activision
Rampage. . . . . 24.
Blackjack Academy(GS). . . . . 17.
Sky Travel(AP & GS). . . . . 34.
Artworx
KaleidoKubes(GS). . . . . 14.
Bridge 6.0(AP or GS) or Strip Poker II(GS). . . . . 27.
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Laser Force(GS) or Gnarly Golf(GS). . . . . 18.
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Broderbund
Down Hill Challenge(GS). . . . . 22.
Wings of Fury(AP & GS) or Prince of Persia. . . . . 24.
Ancient Art of War or Ancient Land of Ys(GS). . . . 31.
The Dark Heart of Uukrul or VCR Companion. . . . 34.
Centauri Alliance or Jam Sessions(GS). . . . . 34.
California Dreams
Vegas Gambler(GS), Vegas Craps(GS) or Triango(GS). 27.
Tunnels of Armageddon(GS) or Club Backgammon(GS). 27.
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Crystal Quest(GS). . . . . 31.
Cinemaware
King of Chicago(GS). . . . . 17.
Defender of the Crown(GS) or Sinbad(GS). . . . . 34.
Star Saga 1 or 2(AP or GS). . . . . 35.
Three Stooges(GS) or Rocket Ranger(GS). . . . . 35.
Data East
Batman, Heavy Barrel, or Robo Cop. . . . . 23.
Datasoft
Tomahawk(GS). . . . . 27.
Hunt for Red October(AP or GS). . . . . 22.
ECLAT
Geographic Jigsaw(AP or GS). . . . . 30.
Electronic Arts
Marble Madness(GS) or World Tour Golf(GS). . . . . 15.
Music Construction Set(GS) or Skate or Die(GS). . . 15.
Bards Tale II. . . . . 18.
Cartooners(GS), Bards Tale II(GS) or Pipe Dream. . . 22.
Zany Golf(GS) or King's Bounty. . . . . 26.
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Dungeon Master(GS). . . . . 27.
Infocom
Zork Trilogy or Leather Goddesses of Phobos. . . . . 14.
Beyond Zork(AP or GS) or Battle Tech. . . . . 34.
Zork Zero, Journey or ShoGun. . . . . 34.
Interplay
Battle Chess. . . . . 30.
Neuromancer(GS), Battle Chess(GS) or DragonWars(AP & GS). . . . . 32.
Leisure Genius
Clue, Risk, or Scrabble. . . . . 27.
Melbourne House
Quarterback(AP or GS). . . . . 19.
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War in Middle Earth(GS). . . . . 30.
Micro League Sports
Micro League Baseball w/ General Manager & Stat. 24.

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F-15 Strike Eagle or Silent Service(AP or GS). . . . 14.
Micro Revelations
Xenocide(GS). . . . . 30.
Mindscape
Paperboy(AP or GS). . . . . 25.
Super Star Soccer(GS) or Hostage(GS). . . . . 27.
Gauntlet(GS) or Super Star Ice Hockey(GS). . . . . 29.
Captain Blood(GS). . . . . 29.
Shadow Gate(GS), Uninvited(GS) or Deja Vu II(GS). 32.
Balance of Power 1990(GS) or Deja Vu(GS). . . . . 32.
Origin Systems
Times of Lore(AP & GS) or WindWalker. . . . . 27.
Space Rogue, Knights of Legend or Omega(AP or GS). 34.
Ultima Trilogy(I, II & III), Ultima IV or Ultima V. . . 39.
PBI Software
Sea Strike(GS). . . . . 29.
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Kings Quest IV(AP or GS). . . . . 32.
Kings Quest I, II or III (AP or GS). . . . . 32.
ManHunter New York(AP or GS) or Police Quest(AP or GS). . . . . 32.
Software Toolworks
Cribbage/ Gin King(GS). . . . . 29.
Chessmaster 2100 or Life & Death(GS). . . . . 33.
Chessmaster 2100(GS) or Keef the Thief(GS). . . . . 33.
So What Software
Sonix(GS). . . . . 35.
Spectrum Holobyte
Solitaire Royale(GS). . . . . 22.
Tetris(AP & GS). . . . . 25.
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War of Lance. . . . . 29.
AD&D Pool of Radiance. . . . . 30.
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Jet. . . . . 27.
Flight Simulator II. . . . . 32.
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Arkanoid, Bubble Bobble(AP & GS) or Renegade(AP & GS). . . . . 10.
Arkanoid II(GS) or Rastan(GS). . . . . 24.
Qix(AP & GS). . . . . 24.
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Warlock(GS) or Dark Castle(GS). . . . . 33.
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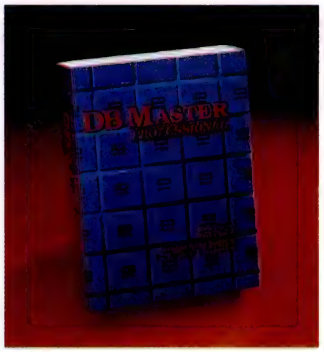

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Big Red Computer
PS Lovers' Utility Set(AP or GS). . . . . 27.
Micol Systems
Micol Advanced Basic(GS) v3.0. . . . . 89.
Roger Wagner
SoftSwitch(GS). . . . . 39.
Merlin 8/16 *(AP & GS)*. . . . . 75.
So What Software
Hyper Launch(GS). . . . . 35.
Call-Box(GS). . . . . 69.
The Byte Works
ORCA/Disassembler(GS). . . . . 32.
ORCA/DeskTop(GS). . . . . 34.
ORCA/M Assembler(GS). . . . . 59.
ORCA/Design Master(GS). . . . . 59.
ORCA/Pascal Desktop Debugger(GS). . . . . 80.
ORCA/C Desktop Debugger(GS). . . . . 80.
TML Systems
TML Source Code Library II(GS). . . . . 35.
TML Speech Toolkit(GS). . . . . 45.
TML Basic(GS) or TML Pascal II(GS). . . . . 82.
Zedcor
ZBasic v4.0. . . . . 39.

Accelerators/Ramcards/Z-80/80 Column Cards

Apple Computer
Apple //e Enhancement Kit. . . . . 65.
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Applied Engineering
PC Transporter Installation Kit IIE. . . . . 35.
PC Transporter Installation Kit GS. . . . . 45.
ViewMaster 80 *(//+)*. . . . . 129.
GS-Ram 256K. . . . . 135.
RamWorks Basic 256K. . . . . 145.
RamWorks III 256K. . . . . 159.
Ramkeeper. . . . . 155.
TransWarp III Accelerator. . . . . 159.
GS-Ram 512K. . . . . 175.
RamWorks III 512K. . . . . 199.
Z-Ram Ultra 1 512K. . . . . 229.
Z-Ram Ultra 2 256K. . . . . 219.
GS-Ram Ultra 512K. . . . . 209.
RamFactor 512K. . . . . 245.
GS-Ram 1MG or Z-Ram Ultra 2 512K. . . . . 249.
Ram Express 512K. . . . . 239.
RamWorks III 1MG. . . . . 269.
GS-Ram Ultra 1MG or GS-Ram Plus 1MG. . . . . 265.
RamFactor 1MG. . . . . 309.
GS-Ram 1.5MG or Z-Ram Ultra 2 1MG. . . . . 325.
TransWarp Accelerator(GS). . . . . 305.
Z-Ram Ultra 3 1MG. . . . . 395.
GS-Ram Ultra 2MG or GS-Ram Plus 2MG. . . . . 389.
PC Transporter (768K). . . . . 309.
GS-Ram Plus 3MG. . . . . 515.
Chinook
C-Ram w/256K(C & C+). . . . . 159.
C-Ram w/512K(C & C+). . . . . 195.
C-Ram w/1MB(C & C+). . . . . 269.
Harris Laboratories, Inc.
GS Load Card. . . . . 55.
GS Sauce Card. . . . . 85.
Zip Technology
Zip Chip 4 MHZ. . . . . 129.
Zip Chip 8 MHZ. . . . . 159.

Printer Interface Cards

Apple
SCSI Card. . . . . 115.
Apple Super Serial Card. . . . . 119.
Applied Engineering
Parallel Pro. . . . . 85.
Serial Pro. . . . . 119.
Orange Micro
Grappler Plus *(AP & GS)*. . . . . 75.
Grappler 9 pin. . . . . 78.
SMT
No Slot Clock. . . . . 30.
Print Tech II. . . . . 33.
Thirdware
Upgrade Kit (FingerPrint I & II). . . . . 30.
Finger Print GSi verIII *(Includes Desktop Accessories-GS)*. . . . . 89.
Finger Print Plus *(Specify Cables: Parallel, Serial, or ImageWriter(II-II+ & IIe)*. . . . . 89.
Xetec Inc.
Superwriter 924(GS,C+,C). . . . . 79.

Accessories

Advanced Gravis
Advanced Gravis' JoyStick(AP & GS). . . . . 39.
MouseStick ADB(GS). . . . . 69.
Apple Computer
Apple Mouse *//c*. . . . . 85.
Apple Mouse *//e*. . . . . 129.
Applied Engineering
TimeMaster II H.O.. . . . . 85.
Conserver(GS). . . . . 85.
Sonic Blaster(GS). . . . . 109.
IBM Style Keyboard. . . . . 119.
Audio Animator(GS). . . . . 195.
Big Red Computer
Labels,Labels,Labels. . . . . 27.
CH Products
Hayes Mach III Joystick. . . . . 33.
Hayes Flight Stick. . . . . 49.
Roller Mouse ADB(GS). . . . . 85.
Digital Vision
Computer Eyes(GS). . . . . 195.
Kalmar
Kalmar roll top 3½ (holds 45). . . . . 14.
Kalmar roll top 3½ (holds 90). . . . . 21.
Kalmar roll top 3½ (holds 135). . . . . 35.
Kensington
Mouse Pocket *(Reg. or ADB)* or Mouseway *(Mousepad)*. 8.
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System Saver GS. . . . . *SPECIAL* 69.
New Turbo Mouse *(Reg. or ADB)*. . . . . 109.
Kraft
Kraft Universal 3 Button Joystick *(IIe, IIc)*. . . . . 34.
Koala Technologies
Koala Pad Plus w/Graphics Exhibitor. . . . . 84.
Kurta
IS ADB Tablet w/stylus(GS). . . . . 289.
Lynx Computer
Turbo Trackball (IIe or GS). . . . . 59.
Mouse Systems
A+ Mouse *(IIc)*. . . . . 59.
A+ ADB Mouse *(GS)*. . . . . 79.
MousTrak
MousePad 7"x 9" Size. . . . . 8.
MousePad 9"x 11" Size. . . . . 9.
MousePad L/F *(Low Friction)*. . . . . 10.
Orange County Speaker
OCS 2-40 (Stereo Amplifier). . . . . 145.
IBL Control 1 Speaker. . . . . 205.
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Cordless Mouse. . . . . 99.
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Street Electronics
Echo IIB (AP & GS). . . . . 105.
Echo IIC (IIC & IIC+). . . . . 129.
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Brother
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Laser Computer, Inc.
Laser 190A w/ Serial Interface. . . . . 239.
Seikosha
Seikosha SP 1000 *(ImageWriter Compatible)*. . . . 229.

Disk Drives & Hard Disk SubSystems

American Micro Research (Micro Sci)
Micro Sci C3 Controller. . . . . 52.
A.5 Half Height *(II+ & IIe)*
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A5D Half Height 5¼" Drive *(IIGS Daisychain)*. . . 155.
AS800K 3.5 Ext. Drive. . . . . 195.
AMR 800K Drive Bundle. . . . . 235.
AMR D20/APS 20MB HD w/SCSI(IIe & GS). . . . 569.
AMR D60/APS 60MB HD w/SCSI(IIe & GS). . . . 799.
AMR 45MB Removable(AP & GS). . . . . 1079.
Applied Engineering
Transdrive Half Height 360K. . . . . 119.
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Multi-Kache w/256K. . . . . 259.
Multi-Kache w/1 meg. . . . . 379.

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Paintworks Gold(GS). . . . . 45.
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816/Paint. . . . . 45.
Beagle Bros.
Beagle Draw(GS). . . . . 52.
Berkeley Softworks
GEOS, GEOCalc or GEOFile. . . . . 45.
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Print Shop Graphics Library I, II, III or Holiday Ed.. . 16.
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Dazzle Draw or Print Shop(GS). . . . . 39.
ECLAT
Fractal Explorer(AP or GS). . . . . *SPECIAL* 28.
Electronic Arts
DeluxePaint II(GS). . . . . 35.
DeluxeWrite w/ Deluxe Paint II(GS). . . . . 59.
Lynx Computer
Supergraphix 256 w/music(GS). . . . . 69.
Roger Wagner
Graphic Exchange(GS). . . . . 35.
So What Software
Iconix(GS). . . . . 29.
Spinnaker
Newsroom Clip Art Collection vol. 1, 2 or 3. . . . . 14.
Certificate Maker Library #1. . . . . 19.
Fonts For Springboard Publisher(GS). . . . . 19.
Certificate Maker or Newsroom. . . . . 26.
Springboard Publisher v2.0(AP or GS). . . . . 79.
Thunderware
Thunderscan Apple (AP & GS). . . . . *SPECIAL* 165.
Virtual Reality Inc.
Visionary(GS). . . . . 279.
Vitesse, Inc.
Quickie(AP or GS). . . . . 215.

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Beagle Bros.
TimeOut TeleComm. . . . . 45.
Point-to-Point. . . . . 59.
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Compuserve Starter Kit. . . . . 24.
L & L
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Abracadata
Electronic Drawing. . . . . 32.
Everybody's Planner. . . . . 69.
ACTAsoft
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Wordbench (AP & GS). . . . . *SPECIAL* 99.
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Timeout MacroTools or MacroTools II. . . . . 19.
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Beagle Write(GS). . . . . 59.
Broderbund
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Claris
Apple Works v3.0. . . . . 175.
Apple Works(GS). . . . . 209.
Dac Software
Dac-Easy Accounting. . . . . 65.
Intuit
Quicken. . . . . 39.
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BusinessWorks Payroll (AP & GS). . . . . 109.
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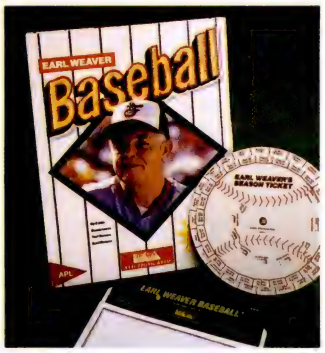

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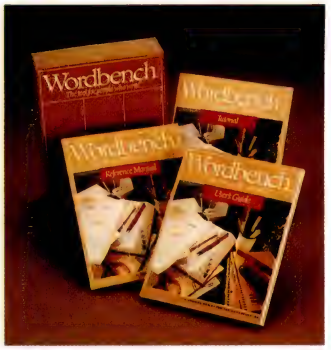

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POKING DYNAMIC Displays

Buy your text a ticket to ride

Most of your programs probably begin by displaying your name and the name of the program. This is fine, but it's easy to make your title screen much more attractive, even with a minimal display of text.

Using the BASIC command POKE, it is easy to create a title screen with moving characters that will catch the user's eye. Such dynamic displays require little code, use little memory or disk space, and can be easily bypassed with a keypress.

"PRINTING" WITH POKE

Using POKE you can place values directly into specific memory locations (POKEing a short machine language routine into memory, for instance). Since the screen display is stored in the Apple's RAM, POKE also can be used to "print" to the text screen.

Figure 1 shows a map of the text screen memory. Apple's primary text screen uses RAM locations from 1024 to 2047. Any value POKEd into this area will be displayed on the screen. The 24 lines and 40 columns of the text screen require 960 bytes of memory. (The other 64 bytes, 8 each at the ends of lines 17 through 24, are used as scratchpad RAM for the eight peripheral slots.) Using **Figure 1**, you can determine the address of any screen memory location; for example, VTAB 20, HTAB 10 is memory location 1497 and VTAB 2, HTAB 3 is 1154.

George Tylutki, P.O. Box 73, La Plume, PA 18440. *This program is compatible with DOS 3.3 and ProDOS.*

Figure 2 provides a simplified table of the ASCII character set. Although there are 256 values in the full ASCII table, the 192 values shown here cover the usable range on the Apple II (excluding lowercase). Using the POKE command, you can "print" any character in the ASCII set, in NORMAL, INVERSE, or FLASH mode, anywhere on the text screen. For instance, POKE 1030,129 places a normal A at VTAB 1, HTAB 7. POKE 1030,65 places a flashing A at the same spot, and POKE 1030,1 places an inverse A there.

WHY POKE INSTEAD OF PRINT?

Why not just use the PRINT command? There are several reasons for printing with POKE.

(1) Sometimes it is just simpler to use POKE. For example, POKE 1552, 26 is easier to type than VTAB 5: HTAB 17: INVERSE: PRINT "Z": NORMAL.

(2) It is easier to mix normal, inverse, and flashing characters using POKE. Instead of keying in 10 commands —

```
10 HOME: VTAB 7: HTAB 7: INVERSE:
   PRINT "A";: NORMAL: PRINT "A";:
   FLASH: PRINT "A": NORMAL
```

— you can key in 4 commands:

```
10 HOME: POKE 1798, 1: POKE 1799,
   129: POKE 1800, 65
```

(3) You can POKE text into column 40 or line 24 without worrying about scrolling. For example, VTAB 24: HTAB 40: PRINT "!" causes the screen to scroll, but POKE 2039, 161 doesn't. You can also POKE inside or outside of text windows or anywhere else as many times as you want and wherever you want.

(4) It is easier to POKE dynamic displays than it is to PRINT them. Using only FOR...NEXT loops and POKE, you can move characters vertically or horizontally across the screen. To do the same thing using PRINT, you must use FOR...NEXT, HTAB, VTAB, often INVERSE, FLASH and NORMAL, and sometimes the MID$, LEFT$, and RIGHT$ functions. By printing with POKE, you can highlight individual letters in a word or words in a line, create moving character displays, move a pointer on screen while waiting for a keypress, and so on.

ENTERING THE PROGRAM

The program in **Listing 1** demonstrates some of the possibilities of using POKE for printing, especially for animated displays. Type it in and save it with

Line	Col 1	Col 40
1:	1024 ->.....	1063
2:	1152 ->.....	1191
3:	1280 ->.....	1319
4:	1408 ->.....	1447
5:	1536 ->.....	1575
6:	1664 ->.....	1703
7:	1792 ->.....	1831
8:	1920 ->.....	1959
9:	1064 ->.....	1103
10:	1192 ->.....	1231
11:	1320 ->.....	1359
12:	1448 ->.....	1487
13:	1576 ->.....	1615
14:	1704 ->.....	1743
15:	1832 ->.....	1871
16:	1960 ->.....	1999
17:	1104 ->.....	1143
18:	1232 ->.....	1271
19:	1360 ->.....	1399
20:	1488 ->.....	1527
21:	1616 ->.....	1655
22:	1744 ->.....	1783
23:	1872 ->.....	1911
24:	2000 ->.....	2039

Figure 1: Text Screen Memory Locations

```
SAVE DYN.DISPLAYS
```

The program begins with an animated menu offering five choices — including the menu, you have six different demonstrations using POKE. Each demo (except #3) will ask you to type in a string of characters; then your string will be moved about the screen in interesting ways. Demo #4 does not move your string, but creates a moving border around it; you can change the border with a keypress.

The demos are contained in subroutines; each is a bit more complicated than its predecessor. In order to make the method of POKEing to the screen clearer, I have placed any lines that the subroutines share (look at the paddle for delay, clear the screen, get a key) in external subroutines. The program will run on any Apple in 40-column mode. It will run on the IIe in 80-column mode, although the menu pointer will be displaced. The complete ASCII table and text screen memory map can be found in the *Apple II Reference Manual.*

BACK AND FORTH

It is easier to move characters across the screen than up and down the screen. To move an inverse asterisk (ASCII 42) horizontally requires that only one variable contain a screen memory location (L). Then, using a FOR...NEXT loop consecutive locations can be accessed. For example,

```
10 HOME: L=1408: FOR X = L TO
   L+39: POKE X,42: POKE X,160:
   NEXT
```

C	I	F	N	C	I	F	N
@	0	64	128	space	32	96	160
A	1	65	129	!	33	97	161
B	2	66	130	"	34	98	162
C	3	67	131	#	35	99	163
D	4	68	132	$	36	100	164
E	5	69	133	%	37	101	165
F	6	70	134	&	38	102	166
G	7	71	135	'	39	103	167
H	8	72	136	(	40	104	168
I	9	73	137	)	41	105	169
J	10	74	138	*	42	106	170
K	11	75	139	+	43	107	171
L	12	76	140	,	44	108	172
M	13	77	141	-	45	109	173
N	14	78	142	.	46	110	174
O	15	79	143	/	47	111	175
P	16	80	144	0	48	112	176
Q	17	81	145	1	49	113	177
R	18	82	146	2	50	114	178
S	19	83	147	3	51	115	179
T	20	84	148	4	52	116	180
U	21	85	149	5	53	117	181
V	22	86	150	6	54	118	182
W	23	87	151	7	55	119	183
X	24	88	152	8	56	120	184
Y	25	89	153	9	57	121	185
Z	26	90	154	:	58	122	186
[	27	91	155	;	59	123	187
\	28	92	156	<	60	124	188
]	29	93	157	=	61	125	189
^	30	94	158	>	62	126	190
_	31	95	159	?	63	127	191

Figure 2: Values to POKE to Text Screen Memory (I = Inverse F = Flashing N = Normal)

The ASCII value for a space is 160; it erases the asterisk. Timing is important in moving displays. If you typed in the last line, you saw (or didn't see) the asterisk fly quickly across the screen. You can slow the movement down by inserting a delay loop.

```
10 HOME: L=1408: FOR X = L TO
   L+39: POKE X, 42: FOR D = 1 TO
   100: NEXT: POKE X, 160: NEXT
```

You can slow down or speed up the demonstrations by adjusting the number 100 in **line 320**. Also, GOSUBs and GOTOs cause delays. Proper timing requires experimentation. If you compile this program or any program with a moving display, the display will run much faster than it does in BASIC (often too fast, as with the menu pointer when paddle 0 is set to 0). Moving displays also can be written in assembly language or directly in machine code, and they run extremely fast.

SIMPLE DEMO

In demos #1, #2, and #5 I use the MID$ and ASC functions to demonstrate how to convert input from the keyboard to the proper values for POKEing (LN=Letter Normal, LI=Letter Inverse). This makes the

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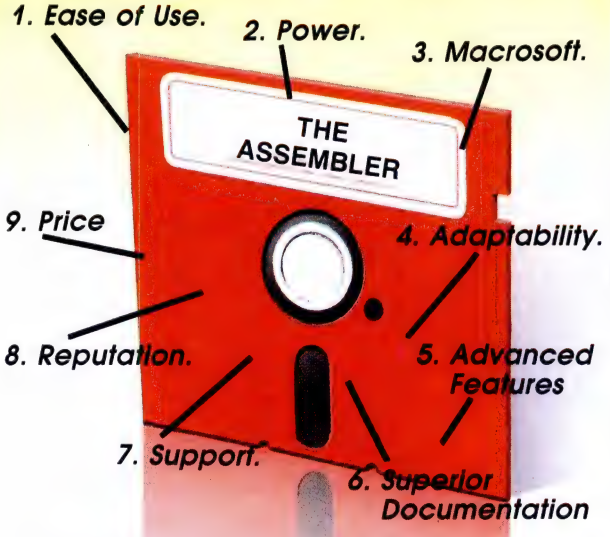

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demos more interesting because you can use your own strings instead of preprogrammed strings. Unlike **lines 410-420**, **lines 510-540** will accept any input except commas and Control-C as the first character of the string. To run the demos without requiring input from the keyboard you should set up the variable values as in demo #3 (**lines 620-630**).

Demo #1 (**lines 1310-1470**) first asks you to type in a string of characters (GOSUB 510). Left to right, it prints each character of the string, first as INVERSE (**line 1320**) and then at the same screen location as NORMAL (**line 1340**). Thus, a white mask one character wide seems to move over the string. If you press a key during the demo (GOSUB 330), the mask reverses direction and moves right to left (**lines 1390-1460**). It will reverse direction each time you press a key. **Lines 1380** and **1450** determine whether you have pressed the Escape key; if so, the program returns

These techniques spruce up your programs without wasting disk space.

to the menu via **line 1470**, which zeroes all variables, including arrays and strings, and sets the pointer value (CC) to 173 (the ASCII value of the dash). Demo #1 shows in a simple form how to move a character back and forth across the screen, highlighting individual characters within a string.

UP AND DOWN

To move characters up and down the screen requires that a different variable contain each screen position (SP) (see **lines 130** and **170**). **Line 130** first sets three variables for the loop in **line 170**: B = Beginning, E = End, and S = Step. SP(1) to SP(6) contain the values of the six screen memory locations, one below the other: VTAB 5, 7, 9, 11, 13, and 15, HTAB 9. At the beginning of the program, POKE −16368,0 clears the keyboard strobe for the first PEEK (−16380) in **line 330**. After the menu is printed to the screen, **line 170** POKEs each of the six vertical screen locations with the value of CC, which is set to 190 (>) in **line 110**. The value of CC (the pointer) is changed after each demo. I could have drawn an arrow (--->), but I wanted to keep things simple.

GOSUB 320 establishes the delay between each POKE. POKE SP(X), 160 erases the pointer. Thus, the pointer is POKEd to the screen in front of each numbered menu choice, erased, and then POKEd to the line below. K is a flag indicating that a key has been pressed (GOSUB 260). The ON...GOTO in **line 210** sends the program to the appropriate subroutine, because the ASCII value of "1" is 177, "2" is 178, etc., and subtracting 176 from P will yield 1, 2, and so on. If no key is pressed, the pointer is moved six times down the screen. Then execution of the program continues at **line 170**, only now the pointer is moved up the screen, because **line 180** reverses the values of the loop (B becomes E, E becomes B, and the step becomes negative). The menu illustrates the basic technique of using POKE to move characters vertically.

NOTES

Each screen line is composed of 40 consecutive memory locations. However, lines are not stored consecutively in memory: Location 1063 is the last column of line 1, but 1064 is the first column of line 9 (**Figure 1**). Therefore, if you enter a string longer than 19 characters in demo #5, the characters will not jump over or under to the next line but to the eighth line below. Try it.

Notice in demo #5 (**lines 810 and 840**) that changing one value (D) is all that is necessary to make the characters move over or under the string printed on screen line 9 (1064). If D=1192, the characters will move under; if D=1920, they will move over. This also illustrates one reason for using variables rather than constants: The functions of complex statements can be easily modified. Using variables also speeds up program execution in Applesoft.

Three blank spaces (ASCII 160) are added to the end of the data string in demo #3 (**line 630**) to bring the characters down out of the air in the loop (**line 700**).

Line 1080 sets the two values that are POKEed for the border (demo #4) to the dash (—) and underline (_) characters. When the demo is first run, alternately POKEing the two values makes it appear that one character is jumping up and down.

Dynamic displays such as these will not replace multicolor Hi-Res displays. However, you can spruce up your programs using this technique without wasting disk space, memory space, your programming time, or the program user's time.

LISTING 1: DYN.DISPLAYS

```
37 | 10  REM *************************
C0 | 20  REM * DYN.DISPLAYS          *
B9 | 30  REM * BY GEORGE TYLUTKI     *
AE | 40  REM * COPYRIGHT (C) 1990    *
CB | 50  REM * MINDCRAFT PUBL. CORP. *
24 | 60  REM * CONCORD, MA 01742     *
45 | 70  REM *************************
3A | 80  REM
41 | 90  REM  INITIAL MENU
1C | 100  REM
2E | 110  PRINT  CHR$ (21):CC = 190: HOME
48 | 120  PRINT "POKING DYNAMIC DISPLAYS BY G. TYLUT
       KI": PRINT "COPYRIGHT(C) 1990 MINDCRAFT PUB
       L. CORP.": POKE 34,3
0D | 130 S = 1:B = 1:E = 6:SP(1) = 1544:SP(2) = 1800
       :SP(3) = 1072:SP(4) = 1328:SP(5) = 1584:SP(
       6) = 1840: POKE  - 16368,0
7E | 140  HOME : PRINT
94 | 150  HTAB 10: PRINT "1--SIMPLE DEMO": PRINT :
       HTAB 10: PRINT "2--ALMOST AS SIMPLE": PRIN
       T : HTAB 10: PRINT "3--WAVING": PRINT : HTA
       B 10: PRINT "4--BORDER": PRINT : HTAB 10:
       PRINT "5--OVER/UNDER": PRINT : HTAB 10:
       PRINT "6--EXIT"
9F | 160  PRINT : PRINT : PRINT : HTAB 10: PRINT "EN
       TER CHOICE"
49 | 170  FOR X = B TO E STEP S: POKE SP(X),CC: GOSU
       B 320: GOSUB 330: POKE SP(X),160: IF K THEN
        190
3E | 180  NEXT :C = B:B = E:E = C:S =  - S: GOTO 170
       : REM  CHANGE DIRECTION
EA | 190 P = P - 176: IF P < 1 OR P > 6 THEN 170
E9 | 200  HOME
73 | 210  ON P GOTO 1310,1530,610,1030,800
EB | 220  TEXT : HOME : END
5E | 230  REM
6B | 240  REM  ------------------
10 | 250  REM  SHARED SUBROUTINES
B9 | 260  REM  ------------------
D2 | 270  REM
36 | 280  HOME : VTAB 20: PRINT "PADDLE 0 CONTROLS S
       PEED": RETURN
89 | 290  VTAB 21: PRINT "ESC TO RETURN TO MAIN MENU
       ": RETURN
3B | 300  VTAB 22: PRINT "19 CHARACTERS MAXIMUM PLEA
       SE ": RETURN
C9 | 310  VTAB 23: PRINT "ANY KEY CHANGES DIRECTION"
       : RETURN
14 | 320  FOR I = 1 TO 100: NEXT : RETURN
4D | 330 K = 0:P =  PEEK ( - 16380): POKE  - 16368,0
       : IF P > 127 THEN K = 1: REM  CHECK KEYBOAR
       D FOR KEY PRESS
7B | 340  RETURN
AE | 350  REM
97 | 360  REM ----------------------
7C | 370  REM  CONVERT STRING INTO
9F | 380  REM INTO NORMAL POKE VALUE
62 | 390  REM ----------------------
2B | 400  REM
CC | 410  HTAB 1: VTAB 4: INPUT "ENTER A STRING (UP
       TO 39 CHARACTERS)    ";S$
10 | 420 L =  LEN (S$): DIM LN(L): IF L > 39 OR L =
       0 THEN  VTAB 4: HTAB 1: PRINT " ": CALL  -
       958: GOTO 410
A8 | 430  FOR X = 1 TO L:LN(X) =  ASC ( MID$ (S$,X,1
       )) + 128: NEXT : RETURN
B7 | 440  REM
B2 | 450  REM ------------------
39 | 460  REM  CONVERT STRING TO
40 | 470  REM  NORMAL AND INVERSE
25 | 480  REM     POKE VALUES
46 | 490  REM ------------------
11 | 500  REM
27 | 510  HTAB 1: VTAB 4: INPUT "ENTER A STRING (UP
       TO 39 CHARACTERS)    ";S$:L =  LEN (S$): IF
        L > 39 OR L = 0 THEN  VTAB 4: HTAB 1: PRIN
       T " ": CALL  - 958: GOTO 510
8F | 520  DIM LN(L),LI(L)
7C | 530  FOR X = 1 TO L:LN(X) =  ASC ( MID$ (S$,X,1
       )) + 128:LI(X) =  ASC ( MID$ (S$,X,1)) - 64

89 | 540  IF LI(X) < 0 THEN LI(X) = LI(X) + 64: REM
        LEAVE CONTROL CHARS AND OTHERS WITH ASCII
       VALUE<64 ALONE
F5 | 550  NEXT : RETURN
03 | 560  REM
FE | 570  REM ------------------
0B | 580  REM  WAVING IN THE AIR
E8 | 590  REM ------------------
30 | 600  REM
8A | 610  GOSUB 290
E6 | 620  DIM LN(20): FOR X = 1 TO 20: READ LN(X):
       NEXT
F5 | 630  DATA        151 ,129,150,137,142,135,160,1
       37,142,160,148,136,133,160,129,137,146,160,
       160,160: REM    ASCII VALUES FOR'WAVING IN
       THE AIR'
D8 | 640  FOR X = 1 TO 17: POKE 1550 + X,LN(X): NEXT

B1 | 650  FOR X = 1 TO 3
EA | 660  POKE 1422 + X,LN(X): POKE 1550 + X,160
DA | 670  GOSUB 320: GOSUB 330: IF P = 155 GOTO 740
23 | 680  NEXT
AE | 690  FOR X = 1 TO 17
8B | 700  POKE 1422 + X + 3,LN(X + 3): POKE 1550 + X
       + 3,160: POKE 1550 + X,LN(X): POKE 1422 +
       X,160
E7 | 710  GOSUB 320: GOSUB 330: IF P = 155 GOTO 740
FB | 720  NEXT
57 | 730  GOTO 650
99 | 740  CLEAR :CC = 190: GOTO 130
87 | 750  REM
80 | 760  REM ----------
81 | 770  REM OVER/UNDER
96 | 780  REM ----------
7D | 790  REM
58 | 800  REM
4D | 810 D = 1192
25 | 820  VTAB 4: HTAB 1: PRINT "OVER OR UNDER? (O/U
       ) ";: GET B$: PRINT B$: IF B$ <  > "O" AND
       B$ <  > "o" AND B$ <  > "U" AND B$ <  > "u"
       AND B$ <  >  CHR$ (27) THEN 820
AD | 830  IF B$ =  CHR$ (27) THEN 140
9C | 840  IF B$ = "O" THEN D = 1920
07 | 850  HTAB 1: VTAB 4: INPUT "ENTER A STRING (UP
       TO 19 CHARACTERS)    ";S$: IF  LEN (S$) > 1
```

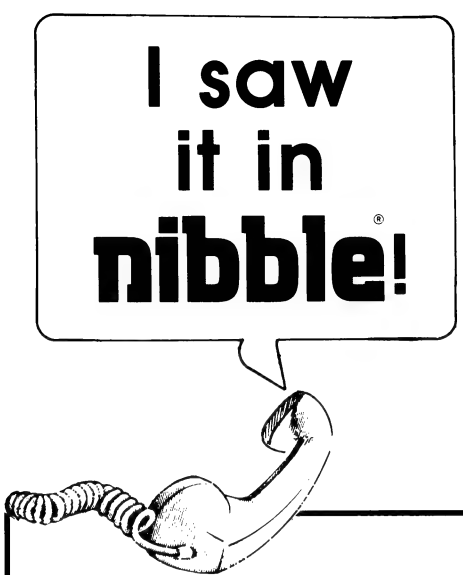
LISTING 1: DYN.DISPLAYS *continued*

```
    9 OR  LEN (S$) = 0 THEN  HTAB 1: VTAB 4:
    CALL  - 958: GOTO 810
EC  860  GOSUB 420
5E  870  FOR X = 1 TO L: POKE 1064 + X,LN(X): NEXT

F6  880  FOR X = 1 TO L
93  890  POKE 1064 + X,160
EC  900  FOR J = X + 1 TO L + X
DC  910  POKE D + J,LN(X): GOSUB 320: POKE D + J,16
    0
62  920  NEXT
8A  930  POKE 1064 + X + L + 1,LN(X)
D4  940  NEXT
28  950  CLEAR
83  960  VTAB 20: PRINT "DO IT AGAIN? (Y/N) ";: GET
     A$: PRINT A$: IF A$ = "Y" OR A$ = "y" THEN
      VTAB 3: HTAB 1: CALL  - 958: GOTO 810
1B  970  CLEAR :CC = 190: GOTO 130
A2  980  REM
E5  990  REM ------
03  1000  REM BORDER
02  1010  REM ------
09  1020  REM
DD  1030  HOME
43  1040  GOSUB 510:A$ = S$
FE  1050  REM  VTAB 4: INPUT "ENTER A STRING PLEASE
     ";A$: IF  LEN (A$) > 40 OR LEN(A$)=0  THEN
     1030
08  1060  VTAB 14: HTAB (40 -  INT ( LEN (A$))) / 2
    : PRINT A$
92  1070 E(1) = 1615:E(2) = 1743:E(3) = 1871
6E  1080 LN = 159:LI = 173
A2  1090  VTAB 19: PRINT "PRESS ANY KEY TO CHANGE B
    ORDER": GOSUB 290
6C  1100  FOR X = 0 TO 39: POKE 1448 + X,LN: NEXT
9E  1110  FOR X = 1 TO 3: POKE E(X),LN: NEXT
99  1120  FOR X = 0 TO 39: POKE 1999 - X,LN: NEXT
48  1130  FOR X = 3 TO 1 STEP  - 1: POKE E(X) - 39,
    LN: NEXT
94  1140  FOR X = 0 TO 39: POKE 1448 + X,LI: GOSUB
    320: POKE 1448 + X,LN
4B  1150  POKE 1999 - X,LI: GOSUB 320: POKE 1999 -
    X,LN
FD  1160  GOSUB 330: IF K = 1 THEN  GOSUB 1210
06  1170  NEXT
3D  1180  FOR X = 1 TO 3: POKE E(X),LI: POKE E(X),L
    N
72  1190  POKE E(4 - X) - 39,LI: POKE E(4 - X) - 39
    ,LN
E2  1200  GOTO 1140
FE  1210  IF P = 155 THEN  POP : CLEAR :CC = 190:
    GOTO 130
A8  1220  IF P > 192 THEN LI = P - 192:LN = P: GOTO
     1250
54  1230  IF P > 127 THEN LI = P - 128:LN = P: GOTO
     1250
0E  1240  RETURN
D3  1250  POP : GOTO 1100
92  1260  REM
73  1270  REM -----------
78  1280  REM SIMPLE DEMO
7F  1290  REM -----------
42  1300  REM
E4  1310  GOSUB 510: GOSUB 310: GOSUB 290
0D  1320  FOR X = 1 TO L: POKE 1920 + X,LI(X)
EE  1330  GOSUB 320
BE  1340  POKE 1920 + X,LN(X)
52  1350  NEXT X
3B  1360  GOSUB 330: IF K GOTO 1380
91  1370  GOTO 1320
EE  1380  IF P = 155 GOTO 1470
37  1390  FOR X = L TO 1 STEP  - 1: POKE 1920 + X,L
    I(X)
B9  1400  GOSUB 320
4C  1410  POKE 1920 + X,LN(X)
28  1420  NEXT X
8C  1430  GOSUB 330: IF K GOTO 1450
C5  1440  GOTO 1390
EC  1450  IF P = 155 GOTO 1470
EF  1460  GOTO 1320
41  1470  CLEAR :CC = 190: GOTO 130
16  1480  REM
EF  1490  REM ----------------
F4  1500  REM ALMOST AS SIMPLE
9B  1510  REM ----------------
32  1520  REM
89  1530  GOSUB 510
D7  1540  GOSUB 290: GOSUB 310
07  1550  FOR X = 1 TO L: POKE 1920 + X,LN(X)
A6  1560  GOSUB 320
79  1570  NEXT X
7B  1580  GOSUB 330: IF K GOTO 1640
40  1590  FOR X = 1 TO L: POKE 1920 + X,LI(X)
98  1600  GOSUB 320
19  1610  NEXT X
67  1620  GOSUB 330: IF K GOTO 1640
E7  1630  GOTO 1550
EB  1640  IF P = 155 GOTO 1760
69  1650  FOR X = L TO 1 STEP  - 1: POKE 1920 + X,L
    N(X)
4F  1660  GOSUB 320
CB  1670  NEXT X
A3  1680  GOSUB 330: IF K GOTO 1740
3F  1690  FOR X = L TO 1 STEP  - 1: POKE 1920 + X,L
    I(X)
10  1700  GOSUB 320
76  1710  NEXT X
CB  1720  GOSUB 330: IF K GOTO 1740
EE  1730  GOTO 1650
A7  1740  IF P = 155 GOTO 1760
96  1750  GOTO 1550
F4  1760  CLEAR :CC = 190: GOTO 130
```

TOTAL: 5253

END OF LISTING 1



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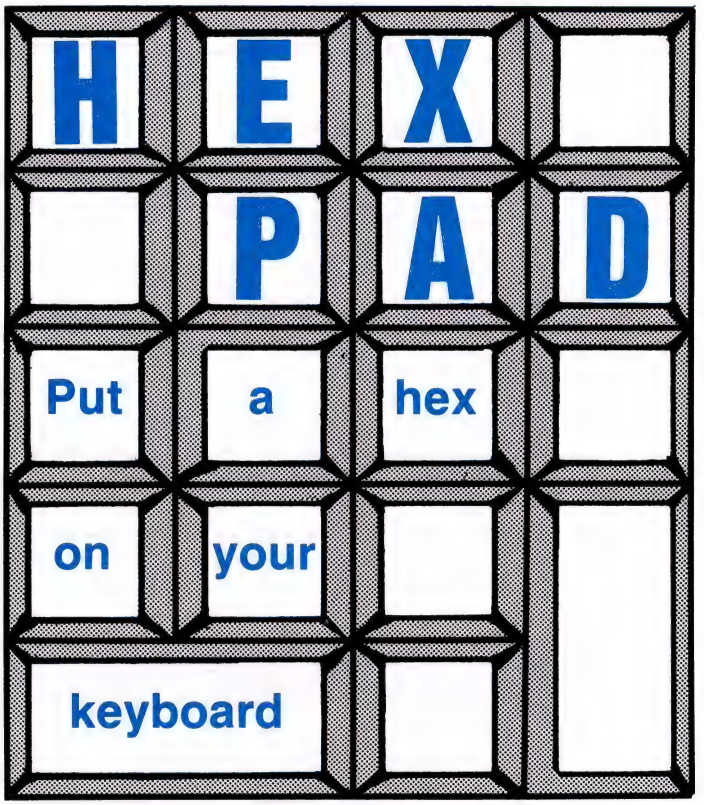

Entering hexadecimal numbers on a normal keyboard can be a frustrating experience. The digits 0 through 9 are all in a row at the top, and A through F are scattered about the keyboard. Even though a numeric keypad eases the task of decimal data entry, it offers little help in entering hexadecimal data.

However, if you own an Apple IIGS, help is available. By using HexPad, you can configure your numeric keypad to act as a hexadecimal keypad, with the digits 0 through F within easy reach of one hand. In addition to the letters, you also gain a space character on the keypad. It may take some practice before using HexPad becomes second nature, but the time and effort is well worth it.

Even if you don't enter much hex data, you may still find HexPad's decimal mode useful. In this mode, any key on the numeric keypad can be changed to a comma key. This can be a great time-saver when typing lengthy DATA statements.

USING THE PROGRAM

To install HexPad, boot into ProDOS and type BRUN HEXPAD. HexPad then makes sure that it is running on an Apple IIGS. If so, an installation message will be displayed.

HexPad recognizes the four commands listed in **Table 1**. After a command has been entered, HexPad sends a "cancel input" signal (Control-X) to Applesoft. This means that any pending input will be cancelled when a command is executed. For this reason, you should enter the HexPad commands only at the beginning of a line, unless you don't want the characters that you have already entered to be acted upon.

The default mode is normal, in which the numeric keypad acts in the same way that it would without HexPad.

Table 1: HexPad Commands

Keypress	Function
Open-Apple-D	Set decimal mode
Open-Apple-H	Set hexadecimal mode
Open-Apple-N	Set normal mode
Open-Apple-C<keypad key>	Maps the comma to <keypad key> in decimal mode

In hexadecimal mode, several keys on the numeric keypad are mapped to other characters, as shown in **Table 2**. For instance, when you press the Clear key, a capital A is generated instead of the normal Control-X code. You can still generate all of the keypad characters by using the equivalent keys on the keyboard. For instance, to generate the "=" character, use the equals sign on the keyboard rather than on the keypad.

In decimal mode, the comma is mapped to one of the keypad keys, and all of the other keys behave normally. You can choose which key you wish to act as a comma with the Configure command. Type Open-Apple-C followed by a keypad key. The key you select will act as a comma. The default key is the minus sign.

Mark A. Heath, 2001 Pearson Drive, Midwest City, OK 73110. *This program is compatible with the Apple IIGS only.*

Table 2: Remapped Keys in Hexadecimal Mode

Keypad Key	Character generated
Clear	A
=	B
/	C
*	D
+	E
−	F
.	Space

HexPad can be disconnected with the command IN#0. If you wish to reconnect HexPad, use the command IN# A$300. From within a program, the commands should be executed as

```
PRINT CHR$(4);"IN#0"
```

and

```
PRINT CHR$(4);"IN#A$300"
```

HexPad will also be disconnected if you press Control-Reset, type PR#3, or type Escape-Control-Q while the 80-column firmware is active. The IN#A$300 command will reconnect HexPad in these cases as well.

ENTERING THE PROGRAM

If you have an assembler, type in the source code in **Listing 1**. The XC command in **line 27** tells the Merlin Pro assembler to generate 65C02 opcodes. If you're not using Merlin Pro, omit this line. Assemble the program and save the object code with the filename HEXPAD.

If you don't have an assembler, enter the Monitor with CALL −151 and type in the hex code in **Listing 2**. While still in the Monitor, type the command

```
230<2000.2168M
```

Press Control-C and Return, and then type

```
BSAVE HEXPAD,A$230,L$169
```

Updating Checkit

HexPad can be a great aid when entering long hex listings. *Nibble*'s Checkit program can also be quite helpful. However, Checkit contains its own input routine and will bypass HexPad if it is installed.

Fortunately, Checkit can be easily updated to accomodate HexPad. Follow these steps:

1. Type LOAD CHECKIT
2. Enter the following Applesoft lines:

```
55 PRINT CHR$(4)"— HEXPAD"
100 POKE 216,0: POKE 921,0: DIM H(3): H(0) =
    1:H(1) = 16: H(2) = 256: H(3) = 4096
140 POKE 921,1: VTAB 10: CALL -958: PRINT "WHAT
    IS THE STARTING ADDRESS OF THE": PRINT "FILE
    (IN HEX)";: INPUT H$: GOSUB 290: A = H
155 IF A < 1024 THEN POKE 0,0
260 IF PEEK (921) = 1 THEN PRINT : PRINT "ENTER
   THE MONITOR BY TYPING": PRINT " CALL -151"
335 IF PEEK (0) THEN POKE 5634,0: POKE 5635,3
375 IF PEEK (0) THEN POKE 34050,0: POKE 34051,3
```

3. Type SAVE CHECKIT.HP

Now, to enter a program using HexPad and Checkit on an Apple IIGS, type RUN CHECKIT.HP. HexPad will be installed automatically. Remember, you still have to enter Open-Apple-H or Open-Apple-D to switch HexPad out of normal mode.

If you enter a hexadecimal file with a starting address below $400, HexPad will be disconnected. This prevents HexPad from being overwritten while it is active (which would cause BASIC.SYSTEM to crash).

While using CHECKIT.HP, do not type IN#A$300 (or any IN#... command). This will disconnect the Checkit input routines.

HOW THE PROGRAM WORKS

HexPad performs its keypad remapping by intercepting all keyboard input. If the key that was pressed is to be remapped, HexPad returns the remapped character rather than the actual keypress.

Lines 33-95 contain the installation code for HexPad, while the main code is contained in **lines 100-206**.

When keyboard input is requested by a program, control is transferred (via the BASIC.SYSTEM I/O routines) to **line 102**. The subroutine GETKEY (**lines 202-206**) is then executed. This routine first checks to see if BASIC. SYSTEM is using the 80-column firmware for output. If so, the firmware routine BASICIN is used to read a keypress. If not, the Monitor routine KEYIN is called.

After a keypress has been obtained, the keypad bit in the keyboard modifier register (see **Table 3**) is checked. If the keypress was in the keypad, then control passes to KEYPAD at **line 137**, where any necessary remapping takes place.

Table 3: Keyboard Modifier Register $C025

Bit	Value	Description
7	0	Open-Apple key not pressed
	1	Open-Apple key pressed
6	0	Closed-Apple (option) key not pressed
	1	Closed-Apple (option) key pressed
5	0	No update since last keypress
	1	Modifier register has been changed since last keypress
4	0	Keypad key not pressed
	1	Keypad key pressed
3	0	Autorepeat inactive
	1	Autorepeat active
2	0	Caps lock inactive
	1	Caps lock active
1	0	Control key not pressed
	1	Control key pressed
0	0	Shift key not pressed
	1	Shift key pressed

If a keypad key was not pressed, the Open-Apple key is checked in **line 111**. If it was pressed, CHKCMD at **line 118** is executed. This routine checks for any command characters, and takes appropriate action.

MODIFICATIONS

One possible modification to HexPad would be the addition of new modes. In addition, more remapping could take place while in decimal mode.

When making changes to HexPad, be sure that the end of the program does not exceed $3CF, since the area at $3D0 and above is reserved. If your program becomes too long, you may have to change the ORG address.

LISTING 1: HEXPAD Source Code

```
*************************
* HEXPAD Source Code    *
* BY MARK A. HEATH      *
* COPYRIGHT(C) 1990     *
* MINDCRAFT PUBL. CORP. *
* CONCORD, MA 01742     *
*************************

* MERLIN PRO ASSEMBLER

HPFLAG   EQU   $00        ;NEGATIVE IF HEXPAD IS INSTALLED
CANCEL   EQU   $98        ;CTRL-X
INBUF    EQU   $200       ;INPUT BUFFER
SYNTAX   EQU   $A677      ;BASIC.SYSTEM COMMAND PARSER
ERROUT   EQU   $BE09      ;BASIC.SYSTEM ERROR HANDLER
VECTOUT  EQU   $BE30      ;BASIC.SYSTEM'S OUTPUT LINK
MODIFIER EQU   $C025      ;MODIFIER KEY REGISTER
BASICIN  EQU   $C305      ;80-COL FIRMWARE INPUT
MAINID   EQU   $FBB3      ;MAIN ID BYTE FOR GS
SUBID1   EQU   $FBC0      ;1ST SUB ID BYTE
SUBID2   EQU   $FBBF      ;SECOND SUB ID BYTE
KEYIN    EQU   $FD1B      ;READ THE KEYBOARD
COUT     EQU   $FDED      ;OUTPUT A CHARACTER
IDROUTINE EQU  $FE1F      ;GS ID ROUTINE

         ORG   $230
         XC                ;65C02 OPCODES

*******************************
* INSTALLATION CODE:          *
*******************************

* LOOK FOR GS ID BYTES:

         LDA   MAINID
         CMP   #$06
         BNE   NOTGS
         LDA   SUBID1
         CMP   #$E0
         BNE   NOTGS
         LDA   SUBID2
         BNE   NOTGS

* ID BYTES OK, BUT ARE THE SAME AS A IIE.
* MAKE SURE WE HAVE A GS

         SEC
         JSR   IDROUTINE
         BCS   NOTGS
         LDA   #$FF        ;FLAG THAT HEXPAD WAS
         STA   HPFLAG      ; INSTALLED

* WE ARE RUNNING ON A GS, SO SET BASIC.SYSTEM
* INPUT VECTORS TO THE HEXPAD CODE

         LDX   #0
:LOOP    LDA   CMDSTR,X    ;MOVE 'IN#A$300' TO INBUF
         STA   INBUF,X
         BEQ   :DONE
         INX
         BRA   :LOOP
:DONE    JSR   SYNTAX      ;PARSE & EXECUTE THE COMMAND
         BCC   PRMSG       ;NO ERRORS
         JMP   ERROUT

* PRINT THE INSTALLATION MESSAGE

PRMSG    LDX   #0
:LOOP    LDA   MSG,X
         BEQ   OUT         ;MSG ENDS WITH ZERO
         JSR   COUT
         INX
         BRA   :LOOP

* NOT A GS, TELL USERS.

NOTGS    LDX   #0
         STX   HPFLAG      ; HEXPAD WAS NOT INSTALLED
:LOOP    LDA   NOTGSTXT,X
         BEQ   OUT         ;MSG ENDS WITH ZERO
         JSR   COUT
         INX
         BNE   :LOOP
OUT      RTS

CMDSTR   ASC   'IN#A$300',0D,00

MSG      ASC   "HexPad has been installed.",8D,8D
         ASC   "Disconnect with IN#0",8D,8D
         ASC   "Reconnect with IN#A$300",8D,8D,00

NOTGSTXT ASC   "HEXPAD REQUIRES AN APPLE IIGS.",8D,00

         DS    \           ;START CODE AT $300

*******************************
```


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LISTING 1: HEXPAD Source Code *continued*

```
 97 * HEXPAD INTERCEPT CODE:       *
 98 ********************************
 99
100 * CHECK FOR KEYPAD OR OPEN APPLE KEY:
101
102          CLD                 ;BASIC.SYSTEM REQUIREMENT
103          JSR   GETKEY        ;GET A CHARACTER
104          PHX                 ;SAVE X-REG
105          PHA                 ;SAVE CHAR.
106          LDX   PADMODE       ;GET PADMODE IN X REG.
107          LDA   MODIFIER      ;CHECK FOR KEYPAD
108          AND   #$10          ;KEYPAD KEY?
109          BNE   KEYPAD        ;YES
110          LDA   MODIFIER      ;CHECK FOR APPLE KEY
111          BMI   CHKCMD        ;YES, CHECK FOR COMMAND KEY
112 EXIT1    PLA                 ;GET CHAR OFF STACK
113          PLX                 ;RESTORE X
114          RTS                 ;DONE
115
116 * CHECK FOR COMMAND:
117
118 CHKCMD   PLA                 ;GET KEY FROM STACK
119          PHA                 ; AND SAVE IT AGAIN
120          AND   #$DF          ;FORCE UPPERCASE
121          LDX   #00           ;INIT X-REG (MODE BYTE)
122          CMP   #"N"          ;IS IT AN "N"?
123          BEQ   SETMODE       ; YES, SET HEXPAD TO NORMAL
124          INX                 ;01=HEX MODE
125          CMP   #"H"          ;IS IT A "H"?
126          BEQ   SETMODE       ; YES, SET HEX MODE
127          INX                 ;02=DEC. MODE
128          CMP   #"D"          ;IS IT "D"?
129          BEQ   SETMODE       ; YES, SET DECIMAL MODE
130          CMP   #"C"          ;IS IT A "C"?
131          BEQ   CONFIG        ; YES, CONFIGURE 'COMMA'
132          BRA   EXIT1
133
134 * KEYPAD PRESS: HOW SHOULD IT
135 * BE HANDLED?
136
137 KEYPAD   TXA                 ;CHECK MODE
138          BEQ   EXIT1         ;NO ACTION
139          CMP   #2            ;DEC MODE?
140          BNE   K2            ;NO
141          PLA                 ; YES, GET KEY
142          BRA   GETNEWKEY
143 K2       LDY   #0            ;INIT Y (NEW KEY OFFSET)
144          PLA                 ;GET THE KEY
145          CMP   #$98          ;WAS THE CLEAR KEY PRESSED?
146          BEQ   GETNEWKEY     ; YES
147          INY                 ;CHECK THE NEXT ONE
148          CMP   #"="          ;WAS "=" PRESSED?
149          BEQ   GETNEWKEY     ; YES
150          INY
151          CMP   #"/"
152          BEQ   GETNEWKEY
153          INY
154          CMP   #"*"
155          BEQ   GETNEWKEY
156          INY
157          CMP   #"+"
158          BEQ   GETNEWKEY
159          INY
160          CMP   #"-"
161          BEQ   GETNEWKEY
162          CMP   #"."          ;WAS THE KEY A PERIOD?
163          BNE   EXIT2         ;NO 'HOT' KEY PRESSED
164          LDA   #$A0          ;CHANGE PERIOD TO SPACE
165          BRA   EXIT2
166
167 * SET HEXPAD MODE:
168 *   X=0 -> NORMAL  X=1 -> HEX  X=2 -> DEC
169
170 SETMODE  STX   PADMODE      ;SAVE MODE BYTE
171          PLA                 ;REMOVE OLD CHAR.
172          LDA   #CANCEL       ;FAKE CTRL-X
173
174 EXIT2    PHA                 ;PUSH THE CHAR IN A
175          BRA   EXIT1
176
177 * CONFIGURE COMMA KEY IN DECIMAL MODE
178
179 CONFIG   JSR   GETKEY        ;GET ANOTHER KEY
180          STA   G1+1          ;STUFF IT IN CMP STMT.
181          PLA                 ;REMOVE OLD CHAR.
182          LDA   #CANCEL       ;FAKE CTRL-X
183          BRA   EXIT2
184
185 * CHANGE KEY ACCORDING TO MODE:
186
187 GETNEWKEY DEX                ;ARE WE IN HEX MODE?
188          BEQ   HEX           ;YES
189          INX                 ;RESTORE MODE
190 G1       CMP   #"-"          ;WE'RE IN DECIMAL, ONLY "-"
191          BNE   EXIT2         ; MEANS ANYTHING
192          LDA   #","          ;CHANGE THE KEY TO ','
193          BRA   EXIT2
194 HEX      INX                 ;SET PADMODE BACK TO HEX
195          TYA                 ;GET KEY OFFSET
196          CLC
197          ADC   #"A"          ;ADD THE OFFSET TO ASC("A")
198          BRA   EXIT2
199
200 * GET A KEYPRESS FROM THE APPROPRIATE PLACE:
201
202 GETKEY   LDY   VECTOUT+1     ;IS BASIC.SYSTEM USING THE
203          CPY   #$C3          ; 80 COL FIRMWARE IN SLOT 3?
204          BNE   :GK1          ;NO
205          JMP   BASICIN       ;YES, USE THE SLOT 3 INPUT
206 :GK1     JMP   KEYIN         ;NO, USE STANDARD INPUT
207
208 PADMODE  DFB   0             ;HEXPAD MODE VARIABLE
```

END OF LISTING 1

LISTING 2: HEXPAD

Start: 2000 Length: 169

```
44 0230:AD B3 FB C9 06 D0 38 AD
8C 0238:C0 FB C9 E0 D0 31 AD BF
30 0240:FB D0 2C 38 20 1F FE B0
E0 0248:26 A9 FF 85 00 A2 00 BD
A7 0250:7F 02 9D 00 02 F0 03 E8
A5 0258:80 F5 20 77 A6 90 03 4C
94 0260:09 BE A2 00 BD 89 02 F0
CC 0268:15 20 ED FD E8 80 F5 A2
19 0270:00 86 00 BD D5 02 F0 06
A8 0278:20 ED FD E8 D0 F5 60 49
91 0280:4E 23 41 24 33 30 30 0D
A7 0288:00 C8 E5 F8 D0 E1 E4 A0
BE 0290:E8 E1 F3 A0 E2 E5 E5 EE
C0 0298:A0 E9 EE F3 F4 E1 EC EC
65 02A0:E5 E4 AE 8D 8D C4 E9 F3
0C 02A8:E3 EF EE EE E5 E3 F4 A0
8F 02B0:F7 E9 F4 E8 A0 C9 CE A3
F7 02B8:B0 8D 8D D2 E5 E3 EF EE
43 02C0:EE E5 E3 F4 A0 F7 E9 F4
76 02C8:E8 A0 C9 CE A3 C1 A4 B3
23 02D0:B0 B0 8D 8D 00 C8 C5 D8
B5 02D8:D0 C1 C4 A0 D2 C5 D1 D5
03 02E0:C9 D2 C5 D3 A0 C1 CE A0
F5 02E8:C1 D0 D0 CC C5 A0 C9 C9
29 02F0:C7 D3 AE 8D 00 00 00 00
06 02F8:00 00 00 00 00 00 00 00
DB 0300:D8 20 8B 03 DA 48 AE 98
07 0308:03 AD 25 C0 29 10 D0 22
C9 0310:AD 25 C0 30 03 68 FA 60
83 0318:68 48 29 DF A2 00 C9 CE
0E 0320:F0 42 E8 C9 C8 F0 3D E8
89 0328:C9 C4 F0 38 C9 C3 F0 3D
14 0330:80 E3 8A F0 E0 C9 02 D0
FF 0338:03 68 80 3C A0 00 68 C9
44 0340:98 F0 35 C8 C9 BD F0 30
36 0348:C8 C9 AF F0 2B C8 C9 AA
5A 0350:F0 26 C8 C9 AB F0 21 C8
90 0358:C9 AD F0 1C C9 AE D0 0A
B0 0360:A9 A0 80 06 8E 98 03 68
A4 0368:A9 98 48 80 A8 20 8B 03
01 0370:8D 7D 03 68 A9 98 80 F2
06 0378:CA F0 09 E8 C9 AD D0 EA
EB 0380:A9 AC 80 E6 E8 98 18 69
CE 0388:C1 80 DF AC 31 BE C0 C3
30 0390:D0 03 4C 05 C3 4C 1B FD
D3 0398:00
```

TOTAL: 4EA9

END OF LISTING 2

PROGRAMS FROM RECENT ISSUES

Nibble software is inexpensive and easy to use. Each disk contains the major programs from the magazine issue noted. You'll learn a lot about your Apple II and have fun doing it. To place your order:

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■JUNE 1990 DISK — Memory Master/ Odometer/Font Conversion Utility/Poking Dynamic Displays. . . Volume 11, Issue #6.

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■MAY 1990 DISK — Directory Designer/ Print Shop Graphic Browser/HyperRes Plus. . . Volume 11, Issue #5.

Order No.: **W31**. . . Introductory price of $12.95 expires 7/31/90. (New price will be $16.95.)

■APRIL 1990 DISK — Sound Wizard/Solving Simultaneous Equations/ProDOS Linker. . . Volume 11, Issue #4.

Order No.: **W30**. . . Introductory price of $12.95 expires 6/30/90. (New price will be $16.95.)

■MARCH 1990 DISK — ProDOS Disk Doctor/Bicycle Log/Custom Bingo. . . Volume 11, Issue #3.

Order No.: **W29**. . . Introductory price of $12.95 expires 5/31/90. (New price will be $16.95.)

For a 90-day period following the publication of each issue, *Nibble* offers the major programs from that issue on disk at nominal "introductory prices."

During the introduction period, products will be shipped without accompanying documentation under the assumption that the buyer has the issue in which the programs appeared. Following the introduction period, the programs will be accompanied by reprints of the *Nibble* articles that documented them.

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MAY 1990 DISK

■Directory Designer lets you arrange the filenames in any ProDOS directory to make life easier. You can group files by frequency of use, the program that created them, or any other criteria you desire.

■Print Shop Graphic Browser shows you all the Print Shop graphics pictures on a disk. You can view four pictures at a time, and zoom through all the filenames to find the ones to view next.

■HyperRes Plus doubles the resolution of the Apple II's Hi-Res screen. Refine your displays with a resolution of 560 dots across the screen. Simple commands are available from Applesoft.

Order No.: **W31**. . . Introductory price of $12.95 expires 7/31/90. (New price will be $16.95.)

APRIL 1990 DISK

■Sound Wizard lets you make beautiful sounds on your Apple II — or, if you prefer, you can take a walk through the wild side of buzzers and flying saucers. Powerful yet easy-to-use commands give you full control over your Apple's speaker.

■Solving Simultaneous Equations crunches numbers galore. This AppleWorks template solves up to four algebraic simultaneous equations.

■ProDOS Linker adds DOS 3.3 compatibility to ProDOS. You'll be able to catalog DOS 3.3 disks from ProDOS and, when you find the file you need, you can load it without using an external program.

Order No.: **W30**. . . Introductory price of $12.95 expires 6/30/90. (New price will be $16.95.)

MARCH 1990 DISK

■ProDOS Disk Doctor helps you cure ailing disks. You can examine the bytes on a disk in detail, and change any of them using hexadecimal or alphanumeric style. Works on all sizes of ProDOS devices.

■Bicycle Log computes your average pedaling speed after you enter the facts about your latest bike trip. This AppleWorks spreadsheet shows your progress by the length of trips.

■Custom Bingo prints out specialized bingo cards on any subject for which you supply the questions and answers. A great twist on the normal drill and practice.

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FEBRUARY 1990 DISK

■Real Estate Advisor gives you the numbers you need to decide if you should continue renting or take the plunge into home ownership. It figures long- and short-term costs, loan payments, and tax benefits.

■Stranded puts you on a desert island where the only other inhabitant is your worst enemy! Both of you have anti-matter bombs, and only one will survive.

■GS Alarm will help you from missing important appointments while using Applesoft BASIC. Set the time and the message, and let your mind concentrate on your work instead of a clock.

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JANUARY 1990 DISK

■Line Manager will spare you from the pain of renumbering Applesoft programs. This ampersand utility uses the auxiliary memory to carry out the process instantly; just enter the first line number of your program, the line-number

increment you prefer, and voila! Line Manager keeps your original program in memory until the new one is created. And if it encounters an error, it leaves your program untouched.

■**Over the Rainbow** is a very special place. You can see a spectrum in the sky only under certain environmental, atmospheric, and physical conditions. This program, which simulates light rays passing through a drop of water, will help you learn when rainbows are most likely to occur.

■**ASCII File Reader II** continues the exploration of GS/OS programming by Sandy Mossberg. Learn to create an application window, draw text within it, and dump the screen to the printer.

Order No.: **W27...$16.95** +shipping

DECEMBER 1989 DISK

■**Treasure Dive** will tantalize the daredevil in you. Chests full of loot lie beneath the waves, but you have to outsmart piranhas, sharks, and deadly ocean mines to reach them. This original, arcade-style game, written in assembly language, will surprise you with its rich sound effects, humorous graphics, and non-stop action. The program has multiple skill levels, and keeps a file of your 10 best scores.

■**Free Space**, a New Desk Accessory for the IIGS, will see to it you never again play guessing games when saving a file. Just pull down the Apple menu, select Free Space, and you'll get an instant report containing the name of each volume (including RAM disks), its capacity, and unused space in kilobytes. Free Space is an assembly-language program, and uses macros to invoke IIGS toolbox routines.

■**Ticket Kit** will put a nice touch on your next fund-raiser, whether it is a raffle, talent show, or car wash. Just enter the particulars — the event, place, date, time, and price — and this program will design and print as many tickets as you need on an ImageWriter printer. Ticket Kit works with other printers after a few easy modifications.

■**Hex File Checker** is a machine-language lifesaver. Use it, and you'll no longer have to check machine-language programs byte by byte to find the typo that slipped by. Just enter the starting address of the program you want checked, and this utility will step through it eight bytes at a time so you can compare the code to the listing.

Order No.: **W26...$16.95** + shipping

NOVEMBER 1989 DISK

■**Nibble Assembler** is your best alternative to an expensive, commercial assembler. All you need to type in assembly-language programs and routines is this application, a ProDOS-based word processor, an Apple with 128K of memory or more, and a listing.

■**Trinum**, a Hi-Res game for two or three players, will stretch your advance-strategy skills. You've heard of a love triangle; now play this logic triangle, based on the game TriNim, but intricate and challenging, a rival for Othello and other computer "board" games.

■**Search Sampler** will show you the difference a binary search can make. Applesoft programs that employ linear searches on large data sets can creep along like cold syrup. This program generates random-number arrays, then uses them to demonstrate the greater efficiency of the binary search.

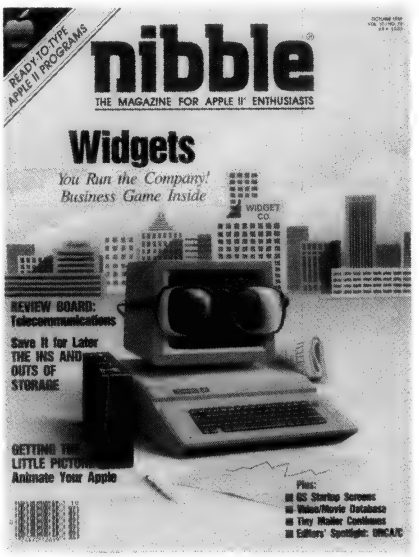
■**ASCII File Reader** is Part 1 of Sandy Mossberg's exploration of a GS/OS Desktop application. This installment deals with the core elements shared by Desktop applications.

Order No.: **W25...$16.95** + shipping

OCTOBER 1989 DISK

■**Widgets** will challenge your business savvy. You're the president of the company, and your decisions about pricing, wages, advertising, research and development will determine its success or bankruptcy. Widgets combines the fun of a computer game with the lessons of running a small business. The result is an enlightening experience.

■**GS Startup Screens** will soften the long delay. All you need are these two short programs, and a Super Hi-Res picture of your own creation or choosing. Once you've installed the art — a title screen, perhaps — you'll never have to worry about it again. Every time you boot the disk, your IIGS will display it automatically.



■**Video/Movie Database** will help you find that certain videotape, even if you don't know its title. Search by actors/actresses, category, year, or director. Video/Movie Database is an AppleWorks application, so you need not be an expert programmer to build it.

■**Getting the Little Picture** displays a colorful, flying rocket on the Hi-Res screen, but it is capable of much more. Use it to explore the world of Apple II graphics.

Order No.: **W24...$16.95** + shipping.

SEPTEMBER 1989 DISK

■**DB Construction Kit** simplifies the database creation process. No longer do you have to be a programming genius to build a database dedicated to your task, one that will work more quickly and efficiently than a general-purpose, commercial program.

■**Wordsearch Wizard** makes building those brainteasers almost as fun as solving them. Just enter in the words you want to "hide," edit them as necessary, and press the Return key. Title the result, and a printout is just another keystroke away.

■**Appleworks Gradesheet** can be a teacher's (next) best friend. It can manage student records according to name or test score. It can also help you monitor student progress, generate forms for grade entry, and keep track as students come and go.

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AUGUST 1989 DISK

■**Nibble Number Cruncher,** a powerful, stack-based calculator, performs everything from simple addition to complex statistical and trigonometric functions. Watch it send your work to the printer for an organized, uncluttered printout.

■**PFX** takes the tedium out of handling ProDOS prefixes. Stop typing in those long pathnames and let this tool select the prefix with just a few keystrokes. It can be used from immediate and deferred modes.

■**Mr. Clean** makes dirty disk drives a distant memory. Use the simple installer to add the CLEAN command to ProDOS. Insert your cleaning diskette, type CLEAN and presto! No more endless CATALOGing.

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JULY 1989 DISK

■**Nibble MenuPro** gives you total control of all your files and directories, enabling you to exercise standard commands from one menu.

■**Magic Squares** adds a little spark to a mysterious mathematical configuration. Create huge, odd squares with a few simple commands, then use them for games and educational programming.

■**SuperClock** lets you know the time and date, any time, accessible from any IIGS program.

■**New Desk Accessories in the GS/OS Environment** explains the essentials of IIGS NDAs, with instructions on building your own System Devices NDA.

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We offer practical software that works quickly and easily. And we offer it at a low price! Chances are, you won't find this value elsewhere.

Nibble diskettes are not copy-protected. They come with copies of the original articles that show not only how to use them, but also how they work. It's a great way to learn programming techniques for customizing or writing your own programs.

And because we understand that Apple users don't upgrade every year, all Nibble programs run on the II Plus, IIe, IIc, IIc Plus, and IIGS unless otherwise noted. Many programs are in DOS 3.3 format and can easily be converted to ProDOS. All disks are 5.25 inches unless otherwise noted.

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OUR GUARANTEE

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INVESTMENT ANALYST

■ **The Broker** tracks the performance of your investments and graphically depicts the results, showing the relative profitability of your activities. Easy data entry and a variety of report options make this one of our most popular financial programs for investment recordkeeping.

■ **Nibble Investment Adviser** calculates return on investment both before and after taxes and for various time periods. You can measure the "bottom line" performance of up to 96 different investments, keep track of dividends and other income.

■ **Stock Analyst** develops a history of individual stocks, updates and tracks their performance, then evaluates each investment or the entire portfolio — automatically. Determine the value, amount of return, and your profit or loss if you were to liquidate the portfolio today.

Order No. **F02** Investment Analyst . . . **$26.95**

SMALL BUSINESS TOOLS

■ **The Forms Shop** creates customized letterhead, business forms and stationery in a variety of typestyles. (Requires a printer.)

■ **AppleWorks Plot** adds a Hi-Res plotter to AppleWorks. Print out a graph of spreadsheet or database data, or save it to disk.

■ **AppleWorks Bar Charts** lets you create bar charts from AppleWorks data.

■ **Quick Calendar** prints a full year's calendar on one page.

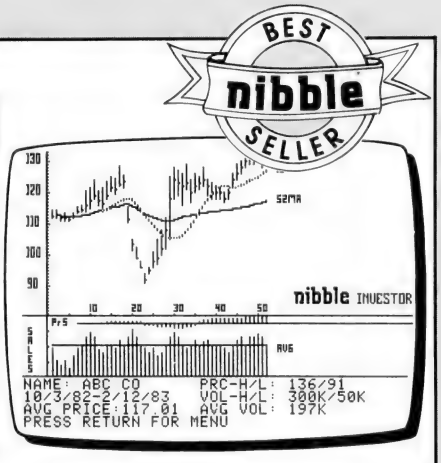
Order No. **F07** Small Business Tools . . **$19.95**

PERSONAL INVESTOR

■ **The Investor** is a best-seller with five different reports including market, sales and yield analyses. Powerful Hi-Res graphs depict short-term and long-term price and market trends for each stock. Invaluable for deciding on sells/buys or for assembling information for tax reporting.

■ **Price File Editor** makes your investment analysis even more efficient. Records can be sorted, deleted or quickly added to the Investor's price files.

Order No. **F01** Personal Investor **$29.95**



MANAGING MONEY

■ **Portfolio** turns your Apple into a personal stock analyst. It generates stock sell signals, tracks price updates, and records all your transactions. You can display up to four purchases of the same stock, track short sales, and review the last 10 turning points in a stock's price to compare the results of different investments.

■ **Financial Calculator** helps you make nuts-and-bolts financial decisions by instantly calculating interest on loans, future fund accounts, money markets, and scheduled deposit accounts. A valuable aid when you go shopping for loans or interest-producing investments. Requires a IIc, IIGS or an 80-column IIe.

■ **Investment Calculator** picks up where spreadsheets leave off. It calculates a variety of internal rates of return, net present value, and net future value of your investments. Find out which investments produce the best return for your cash investment.

Order No. **F08** Managing Money . . . **$19.95**

HOME FINANCE MANAGER

■ **TRAC** (Trend Reporting, Analysis and Control) monitors your credit card, check and cash expenditures. It prints more than 10 different useful reports for analyzing your spending and managing your budget. Discover just where your money slips away — and start saving!

■ **TRAC Budget** is a flexible, fast budget preparation and reporting system. It allows you to easily prepare a personal budget, then prints reports that compare your budget to actual expenditures on an ongoing basis.

■ **TRAC Income** adds a third major module to the system. It generates monthly income statements and year-to-date reports.

■ **TRAC Graph** plots your personal finances in Hi-Res graphics for quick, visual analysis.

Order No. **F03** Home Finance Manager **$19.95**

MONEY SAVERS

■ **Nibble Banker** records and codes checking transactions, helps balance your checkbook and prints out expense reports for the categories you specify.

■ **Nibble Decisionmaker** evaluates alternative buying decisions down to the penny. So you spend your money more wisely.

■ **Loan Payback** instantly calculates the monthly payments on a loan for various principal amounts and interest rates. Requires IIc or IIe with auxiliary 80-column card.

Order No. **F06** Money Savers **$24.95**

SHOPPER

■ **Super Shopper** maintains a master list of up to 1,600 separate items and lets you print out custom shopping lists for each trip to the grocer. Organize items into categories by product type or according to the aisles in your favorite store. (Requires a printer.)

■ **Coupman** keeps track of money-saving grocery coupons, so you maximize your household budget. Coupman lets you organize your coupons, weed out expired ones, and search and sort the coupons you want to take to the supermarket.

■ **Recipe Box** lets you keep your favorite recipes on disk and easily retrieve, edit, display and print out copies for a friend. Planning a party or dining alone? Recipe Box automatically determines the ingredient quantities needed for any number of guests. Your Apple can't do the cooking for you, but it will save you a lot of time in the kitchen.

Order No. **H01** Shopper **$22.95**

NEW!

NIBBLEWRITER

■ **NibbleWriter** is an easy-to-use 40-column word processor. It is screen oriented and includes a full function word wrap, insert and delete functions, and many more useful features.

■ **PrintWorks** lets you use proportional printing in multiple fonts on your Hi-Res screen. Dress up your Applesoft programs with fancy output. A font editor is included so you can create your own proportional fonts.

■ **Print Studio** enhances your ImageWriter by letting you create your own custom characters. You can include not only letters and numbers but also special symbols, and mix your new font with the ImageWriter's built-in fonts.

Order No. **H14** NibbleWriter **$19.95**

CAR AND TRAVEL PACK

■ **Gas Miser** is a thrifty program that tracks gas consumption for selected time intervals or for an entire year, and then plots the results in Hi-Res graphics. Even better, Gas Miser can be easily modified to measure your use of electricity, food or any other household expense. (Requires a printer.)

■ **Apple Highways** finds the best route for your next road trip. It can plan your route, list intermediate cities and highway numbers, and then automatically calculate the mileage for each leg of the journey. You can add to the 170 major US cities included on the disk. Get ready to go!

■ **Nibble Garage** makes preventive maintenance a snap! You just need your owner's manual, and some idea of the date and odometer reading each time your car is serviced. Then relax and let Nibble Garage generate the repair reminders that keep your car running smoothly.

■ **Expense Calc** gives you a quick and accurate picture of your business travel expenditures. This easy-to-use spreadsheet program neatly formats and prints weekly expenses. It can be easily adapted for personal as well as business expenditures.

Order No. **H06** Car and Travel Pack . **$22.95**

NEW!

NIBBLE HOME OFFICE

■ **QuickWriter** emulates an electronic typewriter, for those small typing jobs that should be finished before your word processor finishes loading. This full-featured program allows you to save your work, too.

■ **NibbleCalc** offers you a powerful beginner's spreadsheet. Now it's easy to calculate your budget or to work out your taxes!

■ **Poster Creator** allows you to turn your Hi-Res and Double Hi-Res art into huge posters. With it you can blow up your charts and graphics so they can be seen from across the room. A typical poster can consist of up to 12 sheets of 8.5-11-inch paper for a normal Hi-Res picture or 24 sheets for a Double Hi-Res creation.

■ **AppleWorks Automated Check Register** lets you organize your check spending wisely and thoroughly.

Order No. **H13** Nibble Home Office . **$22.95**

NEW!

HOME MANAGER

■ **Message Center** turns your Apple II into a household bulletin board. Improve communications in your busy home or office, and keep everyone up-to-date on important events. Display messages at certain times, or leave private messages to special people.

■ **Energy Squeezer** can help you take the heat off your utility bill. Discover how your home uses energy and learn where you can save. Spreadsheet-style data entry makes this program a snap to use.

■ **NibbleTerm** connects you to the Apple II online community. This telecommunications program works with your modem to hook you up to other Apples and network services too.

■ **Bill Keeper** helps you organize and chart all your monthly expenses. Witth this menu-driven household bookkeeper you can track expenses for up to 40 different accounts and add up monthly and yearly totals.

Order No. **H16** Home Manager **$26.95**

NEW!

APPLEWORKS ASSISTANT

■ **Proof** allows you to examine what AppleWorks stores in each spreadsheet cell. This program is a valuable debugging and documentation tool for your AppleWorks spreadsheet files.

■ **Works Processor** quickly creates text files from your AppleWorks word processing documents, with or without carriage returns.

■ **ChartWorks** is an AppleWorks graphics utility that allows you to display and graph your spreadsheet files. You can read in files, display them, designate rows and columns of the spreadsheet as arrays, and graph that data in a number of different ways.

■ **NewsMaker** takes text files from AppleWorks or any other word processor and prints them out in two columns. Reduce pasteup chores when using The Newsroom or Print Shop by preformatting your work.

Order No. **H15** AppleWorks Assistant **$22.95**

FREE TIME

■ **Garden Planner** is a fantastic graphics program for designing your garden row-by-row, calculating costs, and projecting the harvest from your efforts. Shift and change your garden layout until it's just right — a planting guide tells you everything you need to know about 45 common vegetables.

■ **Outliner** is a valuable idea processor that helps organize your thoughts in an outline format. It features pull down menus and cut-and-paste editing. Great for planning your time, outlining projects, writing reports, and anything else you can think of.

■ **Tape Library** solves the mystery of what's where in your audio or video tape library. This handy database keeps track of what you've recorded so you can quickly find selections, or find the open space for recording that favorite show that's on tonight.

■ **Jogger** is like having a coach-in-residence. It tracks your daily running progress and puts monthly mileage goals within your reach. It can be easily modified for other sports like swimming and bicycling. Jogger lets you spend less time tracking your sport and more time doing it.

Order No. **H12** Free Time **$22.95**

MAIL MANAGER

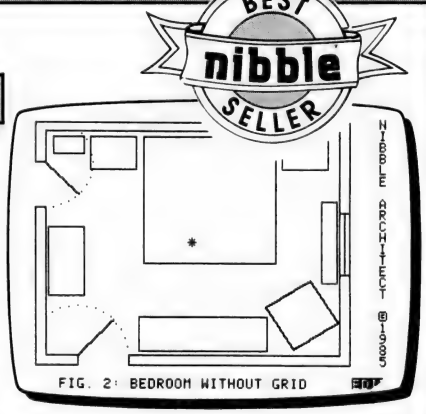
■ **AIM (Automated Intelligent Mailing)** manages your mailings with ease. Because AIM lets you define up to 32 fields of information in each record, you can customize your lists to include exactly the information you need. After defining the format, you can display the data, make any changes, delete, find, sort, and print the labels. An "assembling" feature even lets you select the fields you want to print out on the label.

■ **Postmaster** lets you create records for up to 100 labels, save them on disk, then print them out in a variety of styles. Postmaster is especially handy for any situation where you want to file and print a variety of freely formatted labels. Printing mailing labels has never been easier! (Requires a printer.)

Order No. **H05** Mail Manager **$22.95**

BEST nibble SELLER

HOME ARCHITECT



■ **Nibble Architect** uses the principles behind professional computer-aided design systems, to let you develop floor plans with ease and flexibility. Create, modify, and manipulate up to 50 items per room (including doors and windows) while maintaining accuracy to the nearest inch. Objects can be drawn to scale, and then moved, changed and duplicated — all in Hi-Res graphics that help you easily visualize different layouts. After planning your room design, print the layout and save it on disk for future reference!

■ **The Shape** allows you to create, view, edit and save graphics shape tables. Free-form shapes created in Lo-Res graphics are automatically translated into Hi-Res shape tables that can be used in any Applesoft or assembly language program. Have fun jazzing up your own programs with your own graphics. Requires Apple II Plus and IIe only.

Order No. **H07** Home Architect **$29.95**

(continued)

CALENDAR LIBRARY

■ **Nibble Desk Calendar** is a quick-reference desk calendar that lets you highlight dates and print out a list of the corresponding events. Menu bar selection makes entering, changing or deleting events a snap!

■ **Personal Appointment Calendar** keeps track of a year's worth of appointments with fast editing and printing.

■ **Quick Calendar** prints a full year's calendar on a single page. You'll never need to buy a calendar again!

Order No. **H08** Calendar Library **$16.95**

DIETER

■ **Diner** is a personal diet planner that not only provides you with a nutritional analysis of foods and entire recipes, but also helps you keep track of your eating habits. The disk includes a database of over 400 foods, showing vitamin, mineral, protein, cholesterol, fat and calorie content. Now you can customize your menu planning to match your body type, and develop both long-term and short-term diet planning. Users have told us that Diner out-performs other similar programs costing many times its price.

■ **Calorie Counter** tallies your calorie consumption with the calorie contents of the foods you eat. You assign calorie data to breakfast, lunch, dinner or snack categories and an automatic warning is flashed when you go over your daily limit!

■ **Fat Graph** tracks your dieting progress by plotting weight changes in glowing Hi-Res color. Just enter your weight every day; Fat Graph will plot it over time (for up to 120 days), and display your progress.

■ **Recipe Box** makes cooking simple by keeping your favorite recipes on disk. Planning a party or dining alone? Use Recipe Box to automatically determine the ingredient quantities needed for any number of guests. You can even include notes to remember which recipes were hits!

Order No. **H02** Dieter **$26.95**

DATABASE LIBRARY

■ **Executive Card File** puts an electronic index card file at your fingertips. You'll get tremendous flexibility with easy data entry and editing, speedy sorting and disk-based storage. Data can be entered and organized in virtually any manner. Each "card file" may contain up to seven sections and as many as 35 index cards can be stored in each section. Each card can hold nearly 500 characters. Once filed, index cards can be displayed, edited, sorted, removed or printed to a printer.

■ **Nibble File Cabinet** can be used to keep track of household or business information such as names and addresses, home inventory and everything else. Information stored in your File Cabinet can easily be modified, rearranged or displayed. Nibble File Cabinet includes variable length records with key sorts and binary tree data storage. A Nibble best-seller!

■ **Applesoft Record Command System** (ARC) is a comprehensive information management program. Features include advanced data filing, editing, printing and telephone dialing. Search records, merge files and send data to your printer. And since your entire data set is stored in memory, ARC is fast.

Order No. **H10** Database Library . . **$24.95**

SOUND MAKER

■ **Sound Synthesizer** creates sounds ranging from a complete musical score to explosions, machine guns and even bird calls. This sound creation utility lets you "draw" your sound effects on the screen in Hi-Res graphics. All sound effects can be saved on disk and replayed with a single command or stored in libraries for later use in your own Applesoft or machine language programs.

■ **Nibble Duet** jazzes up your programs with synthesized two-voice sounds. Create sophisticated sound effects to complement your visual effects. A demonstration program shows you how to vary them and add sounds to your programs.

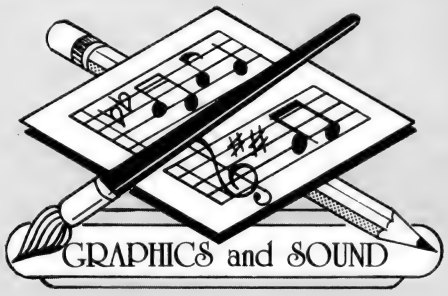
■ **Apple Talker** turns your Apple into a digital recorder. Sounds and words prerecorded on tape are played into the Apple via the cassette input, sampled and stored in memory and on disk. You can add speech to your programs without purchasing any expensive hardware. (Not compatible with the IIc or IIGS.)

■ **Beep Customizer** lets you modify your Apple's beep and includes the changes in other DOS 3.3 programs.

Order No. **S02** Sound Maker **$19.95**

MUSIC MAKER

If you've tried incorporating music into your programs, spent hours fiddling with POKEs and



CALLs, and still haven't gotten the musical notes you want, then try Music Maker — before you break your baton.

■ **Tunes** is an easy-to-use music system designed for quickly entering any tune into your Applesoft program. Play any note in a four octave range, with a duration as short as a quick click or as long as six continuous minutes! With a little extra effort, you can create songs and snazzy sound effects. Sharps, flats, duration, staccato, pauses, and all of the other piano/organ effects are there at your fingertips.

■ **Nibble Maestro** transforms your Apple keyboard into a four-octave organ. As you touch the keys, your Apple plays the corresponding notes and they simultaneously appear in the staff on the screen. Songs may be stored on disk where they can be edited or replayed. Use all 49 notes to compose tunes with Nibble Maestro.

■ **Little Organ Apple** is a Hi-Res representation of a two-octave organ keyboard that you can really play! This instrument can be used by anyone for entertainment, by musicians for experimentation, and by students for practice.

■ **Happy Birthday** plays the "Happy Birthday" song and displays the words complete with the birthday person's name. Perfect for your youngster's next birthday.

■ **Guitar Chord Tutor** draws the first six frets of a guitar, and then uses Lo-Res graphics to overlay the proper finger placement. All basic major, minor and seventh chords are available. There's even a special feature that lets you measure your progress.

Order No. **S01** Music Maker **$22.95**

NEW! GRAPHIC LIBRARIAN

■ **Shape Librarian** lets you more easily work with Hi-Res shapes. This powerful utility helps you combine tables, delete shapes, insert shapes, and more.

■ **Getting the Big Picture** compresses Hi-Res graphics to 25 to 50 percent of the space required by normal pictures. Whether you're designing graphics for an arcade game or for business presentation software, you will find this program invaluable.

■ **Mousetrap** takes your Hi-Res graphic and stores it in Print Shop format. Use the mouse or keyboard to capture any part of the Hi-Res screen.

Order No. **A12** Graphic Librarian . . . **$18.95**

GRAPHICS PROGRAMMER

■ **Hi-Res Houdini** performs Hi-Res magic on your Applesoft or assembly language programs. Use machine language utility to create special graphic effects: scrolling and shifting images, changing shape colors, inverting Hi-Res colors, and merging, copying and swapping pictures on both screens. The graphics are amazing, and it's magically easy to use.

■ **Hi-Res Fill-Reverse** adds pizzazz to your Hi-Res graphic displays. Specify any rectangle and fill it with the color you select. Then use Reverse to create an explosion or produce other spectacular effects.

■ **Graphics Toolbox** is all you need to create dynamic animations. You'll have fun watching the effects produced by switching Hi-Res pages, inverting the images, and superimposing the page 2 image on page 1. A super tool for creating special effects.

■ **Amper DHR** taps your Apple's Double Hi-Res capabilities so you can produce sharper, more realistic graphics. Use special commands in your Applesoft programs to simulate normal Hi-Res commands. You get twice the normal horizontal graphics resolution on your Apple. (Requires at least 128K of RAM; not compatible with the Apple II Plus.)

■ **Eye Openers** makes a dramatic transition from one Hi-Res picture to another with an opening iris effect. An ever-widening hole appears in the center of the old image, revealing the new image. Add excitement to your own Applesoft graphics shows!

Order No. **A05** Graphics Programmer **$18.95**

PRESENTATION LIBRARY

■ **Chart Manager** transforms numeric data into sophisticated graphics. This versatile program performs basic statistical analyses, sorts and edits data, produces linear regressions, and then transforms the data into Hi-Res scatter plots, pie charts and bar graphs. Perfect for sales analyses and forecasting, personal finance evaluations, and investment analysis!

■ **Banner Boss** creates custom, eye-catching banners for parties, promotions — or any special occasion. Messages can be up to 255 characters long, written in letters two or five inches high, with underlining and emphasized print to add a personal touch. Say it with banners! (Requires a printer.)

■ **Color Billboard** turns your Apple into a dynamic electronic billboard for displaying attention-getting messages in 15 different colors. Features include smooth, fast text scrolling and colored blinking lights. Great for leaving messages for the family, or for math or language flashcards in school, or for advertising messages in your store.

■ **Solid State Slide Show** stores Hi-Res pictures and displays them with the speed of a slide show. You can store up to 18 different pictures to be used in your presentation. Use it for games or as an attention-getter in a store or trade show. (Requires at least 64K of RAM.)

Order No. **A04** Presentation Library . **$19.95**

WINDOWORKS

■ **WindoWorks** produces up to 50 dazzling animated windows with seven different types of animation that include: four-way scrolling, flashing regions, changing colors, and flashing window frames. Make text flash, curve, and dash across the screen for great displays.

■ **Ultra Fast Pix** saves and loads Hi-Res screens at lightning speed. You can scan and display 17 pictures on disk in less than 10 seconds. Snazzy promotional tool. Requires II Plus, IIc, IIe and a 5.25-inch disk drive.

■ **Text Sculpture** turns ordinary text into almost any shape you can fit on the printed page — with a standard printer. Draw profile faces, decorative designs, and anything you can imagine.

■ **Wipeouts** gives you 10 novel ways to clear screens: top-to-bottom, bottom-to-top, left-to-right, right-to-left, or even fan outs from the center of the screen.

Order No. **A09** WindoWorks **$19.95**

DESIGNER/ILLUSTRATOR

■ **Designer and Illustrator** let you create complex graphics for gardening/landscaping, title displays, games development, or circuit/pipe layouts the easy way! Use the Illustrator to create graphics shapes; use the Designer to combine the shapes in your graphics library to build complex, professional displays. You can scale, color, edit, rotate and even redraw your shapes in "medium resolution" graphics. Make things look the way you want them to look — and have fun doing it too!

■ **The Shape** takes advantage of the Apple's powerful graphics capability. It allows you to create, view, edit and save shape tables. The free-form shapes created in Lo-Res graphics are automatically translated into Hi-Res shape tables. Have fun jazzing up your own programs with graphics that you design.

Order No. **A02** Designer/Illustrator . . . **$19.95**

TURTLE LIBRARY

■ **Turtle BASIC** adds turtle graphics commands to Applesoft. You use 24 special key-words to direct the "turtle" around the screen, print Hi-Res text, create animation and more. Turtle BASIC is fast. But watch out! Once your children learn the turtle, they may leave you in the dust.

■ **Apple Turtle Graphics** lets you use simple commands to move and turn the turtle, as it draws pictures on the screen. Turtle Graphics is an excellent tool for learning simple programming concepts, conceptualizing math concepts and geometry, or just creating nifty pictures.

■ **Turtle Tutor** is a demonstration library that shows you how to design your own pictures, combine them . . . even create 3-D effects.

Order No. **A01** Turtle Library **$22.95**

ARTIST

■ **Apple Paint Box** is an electronic coloring book that combines the features of an Etch-A-Sketch, Spiro-Graph and a function-driven drawing board. Once you've drawn your shape, you can fill it with a flood of color.

■ **PAGE (Programmer's Aid for Graphics Entry)** lets you draw Hi-Res graphics, and then save them to disk as screen images or as program lines to include with your favorite Applesoft program. It also features a Help screen and options to draw, erase and change colors. At last! An alternative to shape tables.

■ **Art Gallery** is a Hi-Res video show of 33 different art forms, some accompanied by sound. Each art form has multiple variations and provides hours of entertainment. Just sit back and enjoy it.

■ **Hi-Res Shapemaker** is an easy-to-use program that enables you to draw boxes, lines or shapes, fill them in, and then frame the pictures. When it's finished, your masterpiece can be saved on disk.

■ **DHR Palette** lets you design Double Hi-Res graphics in black-and-white or color, and save the entire screen to disk for future fun. (Requires at least 128K of RAM; compatible with the unenhanced IIe only.)

Order No. **A03** Artist **$18.95**

NEW!

ART DIRECTOR

■ **Transformer** stretches the capabilities of your Hi-Res screen! Twist, stretch, and shrink any portion of the screen.

■ **Snapshot** prints out Hi-Res pictures vertically or horizontally on your ImageWriter.

■ **SpeedDraw** is an Applesoft tool that lets you create smooth curves and sharp angles on your Hi-Res screen. It takes care of all the trigonometry for you and all you have to do is learn SpeedDraw's ampersand commands.

■ **Fractal Trees** shows you how fractals, the exciting combination of mathematics and graphics, create the shape of nature. You can set up normal-looking fractal trees, or go for the alien and the bizarre!

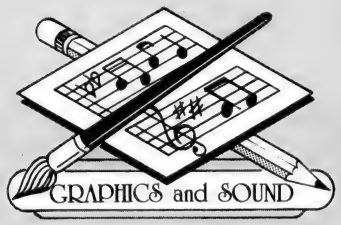
Order No. **A11** Art Director **$19.95**

SIGHT AND SOUND

■ **AmperPalette** is a powerful library of 22 ampersand commands that produce Double Hi-Res graphics in Applesoft. Use the special double-resolution 16-color mode or your IIe, IIc or IIGS, and even add music to your programs.

■ **Arcade Sound Editor** adds Zaps, Booms, and Kapowee's to your programs for real arcade excitement. This two-pitch sound creator produces a wide range of interesting and dramatic effects. Requires a II Plus or a IIe.

■ **HPLOT GS** lets you create super Hi-Res graphics in 16 colors which can be changed to any of the 4096 colors available on the Apple IIGS. Define colors by specifying the red, green, blue concentration and then draw, plot and paint to your heart's content.



(continued)

■ **Hi-Res Tricks** adds 15 more routines to your graphics library for scrolling, mirror imaging, flipping, or even producing upside-down graphics screens. This utility gives your programs extra visual punch and it's a cinch to use.

Order No. **A10** Sight and Sound **$19.95**

FONT FOUNDRY

■ **The Font Foundry** is a character generator and editor that you can use to design one-of-a-kind Hi-Res character sets. Make your documents print shop perfect!

■ **Double Hi-Res Characters** prints legends and captions in a variety of special character sets, including DOS Tool Kit format characters.

■ **Print Shop Utility** lets you capture an area from the Hi-Res screen and import it into Print Shop.

■ **Font Blaster** makes your Apple print like a Mac. It lets you use dozens of Tool Kit typefaces or create custom characters for the ImageWriter and Prowriter.

Order No. **A08** Font Foundry **$22.95**

NEW! IIGS GRAPHICS ASSISTANT

■ **Supergraphics GS** gives you the power to create stunning Super Hi-Res displays from BASIC. The 15 ampersand commands control the graphics screen from within your own Applesoft programs. Complete palette control lets you achieve dazzling effects.

■ **Super Hi-Res Picture Packer** compresses and displays your collection of Apple IIGS Super Hi-Res Graphics. Store an art gallery on disk with the space this handy utility will save. You can also pack and unpack selected rectangular portions of the screen, to animate your own graphics!

■ **The Graphics Switcher** converts Super Hi-Res graphics to standard Hi-Res graphics. Enjoy IIGS art on any Apple II.

■ **GS/FX** provides you with three stunning new ways to look at graphics on the IIGS. You can present a black screen and watch your picture load in color by color. You can also fade your picture out to black or "fold down" the screen, color by color.

■ **Super Hi-Res Graphics Converter** brings all of your Hi-Res artwork to the Apple IIGS graphics screen, with many options for the type of display.

Note: 3.5-inch disk only.

Order No. **A13** IIGS Graphics Assistant **$29.95**

Home/School Education

CLASSROOM MANAGER

■ **Nibble Grade Book** gets high grades from teachers! It easily tracks and analyzes test scores, then calculates and prints the grades for up to 10 classes of 80 students each. This versatile program lets you store test grades and test descriptions, calculate cumulative grade points and percentage grades for each student. You can assign letter grades and determine the mean grade and standard deviation of a test. You can even drop the lowest test grades and adjust test scores for the entire class. An indispensible tool for all teachers!

■ **Personal Appointment Calendar** keeps track of up to 15 memos per day for a year's worth of appointments. And if you like to see everything in writing, just select and print out the appointments you need for quick reference.

■ **Executive Card File** puts an electronic index card file at your fingertips. You'll get tremendous flexibility with easy data entry and editing, speedy sorting and disk-based storage. Data can be entered and organized in virtually any manner. Each "card file" may contain up to seven sections and as many as 35 index cards can be stored in each section. Each card can hold nearly 500 characters. Once filed, index cards can be displayed, edited, sorted, removed or printed to a printer.

Order No. **E01** Classroom Manager **$26.95**

IT'S FUN TO LEARN

■ **Shark** is a graphics math game your kids will love. Save the fish from being gobbled up by solving math problems and get bonus points for speed. But expect problems to get more difficult as the game progresses. That's the challenge and the fun.

■ **Spelling Maze** takes a no-fail approach to teaching children to spell. Move the player through the graphic maze picking up letter-keys in the correct order to open the exit and escape. Music rewards your child's progress.

■ **Learn the USA** uses map graphics to help teach the location and capital of each of the 48 contiguous states. It tracks incorrect answers so you can measure your progress with each play.

■ **Keyboard Tutor** uses an on-screen graphics keyboard to provide home key instruction, key/finger drills, and accuracy tests for typing. It also includes an on-screen help and fast animation of finger-to-key visual aids. Outstanding typing aid.

Order No. **E14** It's Fun to Learn **$16.95**

SCIENCE AND FUN

■ **Nibble Planetarium** has many of the features of a real planetarium. This Hi-Res star charting system displays the sky from any location in the Northern Hemisphere at any time of the year. A special mode lets you view the night sky and see how it changes with the passing hours. A great learning tool for amateur astronomers! *Bonus:* Includes a special unpublished file that includes all the major constellations — over 600 stars!

■ **The Serpent's Coil** traces the destructive paths of the hurricanes as they snake through the Gulf of Mexico and the Caribbean on a collision course with the U.S. coast. Track hurricans on the Hi-Res screen, and the plot, scale, and label them for printing. Plot data for new storms, or track eight historic hurricanes, such as the Great Galveston Storm of 1900, Camille (1969), and Alicia (1983), that are included on the disk.

■ **Direction Fields** displays the intricate patterns of direction fields in Hi-Res graphics using the mathematical function you supply. Wind directions, patterns of iron filings in a magnetic field, and air flow patterns are just some of the phenomena you can investigate. For fun, you can also create fascinating abstract patterns.

Order No. **E08** Science & Fun . . . **$29.95**

MATHEMAGICIAN

■ **Math Monster** makes scary fun out of math learning. Can your children solve the multiplication or division problem before the Math Monster gobbles them up? That's the challenge — and the fun. When your child wins, the Professor runs across the screen and whacks the monster soundly. But, if they don't learn those multiplication and division facts, watch out! The Math Monster will eat them up!

■ **Math Marathon** is a math practice program that drills your children in addition, subtraction, multiplication and division. Varying levels of difficulty will help keep your kids in the running for good grades in math tests!

■ **Apple Trig** plots your favorite trigonometric functions in Hi-Res graphics. Watch the graph being plotted, and then overprint graphs to make comparisons. Apple Trig lets you graph the sine, cosine, tangent, cotangent, secant and cosecant functions. A great learning tool for home or school.

■ **Mathemagician** makes solving word problems magically easy. Your children's wits and math skills are their weapons in this exciting adventure game. They'll love solving the mathematical word problems to unlock doors, discover hidden treasure and escape lethal perils. It's fun to build math skills!

■ **Math Concentration** puts a new twist on an old theme. To win, your child must uncover matching colored pictures and solve math problems. Math Concentration facilitates memorization and the development of basic math skills — the fun way.

Order No. **E05** Mathemagician **$22.95**

WORDS AND NUMBERS

■ **Flashcard** takes the drudgery out of math drill! Pace the speed of the drill to suit the learner: fast or slow, with one or two chances to give the correct answer. Flashcard plots a colored bar graph of successes and redisplays any problems that were missed. With Flashcard, kids can both enjoy using the Apple and learn their math tables.

■ **Universal Metric Converter** converts English and metric units with menu-driven ease. How many milliliters in a gallon? What's your weight in kilograms? Forget all those conversion factors, and let this program do the work for you!

■ **Trivia Master** never lets you run out of questions because it lets you make up your own. The quicker responses receive higher scores — if you're right. Because you can create and adjust the difficulty level of questions, Trivia Master can be challenging and entertaining for all ages. Trivia Master includes a file of 200 questions to get the party going.

■ **Word Find** lets you make your own hidden word puzzle mazes of any size up to 40 rows and 40 columns. Then print them out on your printer, with clues and a separate answer sheet. Fun for young and old. (Requires a printer.)

■ **Life** is a graphic version of the incredibly popular game of Life that was originally published in Scientific American. You set up a starting colony of cells and watch the birth, survival and death patterns of the cells as generation after generation evolve, grow, migrate, move and behave in completely unpredictable patterns. A unique simulation.

■ **Binary Clock** is an amusing and unusual timepiece for the dedicated programmer. It displays an accurate machine language timepiece in Lo-Res graphics. Put aside your ordinary clock and view the current time as your Apple does — in 8-4-2-1 binary code!

Order No. **E04** Words and Numbers . **$19.95**

COMMANDER

■ **Nibble Beach Head** puts you in command. Destroy the enemy machine gun emplacement, while avoiding mortar attacks and machine gun fire. Each soldier is equipped with only a rifle and two grenades. However, the enemy has snipers, machine guns, mortar shells, barbed wire and mine fields. A must for war game and strategy fans.

■ **Tank Combat** simulates the deadly struggle of World War II tank combat. Strategy and foresight are the keys to winning, as you maneuver to defend your HQ, ammo dump and fuel depot against enemy fire. Use your six tanks wisely, or you won't survive the night.

■ **Artillery Duel** is a realistic artillery simulation with a twist of math. From opposite sides of a mountain, you shell your enemy's encampment. The best judge of fire power, barrel elevation, and a fickle wind will survive. This Hi-Res action will fascinate the math buffs.

■ **Atlantic Convoy** pits your navy against the enemy in an all-out struggle for the Atlantic. You need strategy and skill to maneuver your fleet of carriers, destroyers, submarines, and support vessels. Each type of vessel has unique attack, defense, and movement capabilities. Can you defeat the enemy before you run out of fuel or get sunk? Great entertainment on the Hi-Res seas!

Order No. **G05** Commander **$19.95**

GHOST GOBBLER

■ **The Nibbler** is the classic dot-gobbler: eat all of the dots in the maze while avoiding orange ghosts! Gobble the colored dots, munch on an energy cube for that extra boost of power, and keep progressing through mazes of increased difficulty. A feast of fun!

■ **Clam Bake** makes you the hapless, hungry clam trapped in a kelp bed. To survive you must outmaneuver the deadly jellyfish, eat all the diatoms, and advance through the seaweed mazes. Four life-saving pearls are your only weapons. Clam Bake features stop/start options and optional sound effects.

■ **Speed Maze** challenges you to navigate a randomly generated maze as fast as you can. The wide range of selectable speeds makes the game fun for both novices and experienced players. And if you're a programmer, you'll find a fascinating algorithm for generating mazes.

Order No. **G10** Ghost Gobbler **$19.95**

ATTACK PACK

■ **Surprise Attack** is one of the best arcade games we've published. It pits your skill and three defensive missile bases against an incoming horde of ICBM's. Your objective: the survival of six cities under your protection. Provides hours of white-knuckle challenge.

■ **Major Mayhem** puts you on a planet ruled by spiders. It challenges you to traverse a web of alien cities and collect enough energy spheres to refuel your ship and escape. But watch out, the spiders are coming!

■ **Barricade** is a two-player game of luck and strategy. Use a giant claw to demolish a wall of colored blocks. Grab the high-scoring blocks to win, but beware of mystery blocks. They can mean big gains — or big losses.

■ **Starlaser** puts you at the helm of a fast, laser-equipped starship. Battle the Kloryon starbases before your fuel supplies are exhausted. Be careful though. The Kloryons are notorious for making end run attacks from behind the meteor belt.

Order No. **G17** Attack Pack **$18.95**

ELECTRIC ARCADE

■ **Formula Nibble** puts you behind the wheel of a Grand Prix race car taking the curves at top speed. Three super-realistic, full-color Hi-Res tracks simulate races on actual Grand Prix circuits. Start your engines!

■ **Voratio** is the hungry space worm. Guide it in search of food through your choice of 19 challenging levels.

■ **Othello and Seawolf** are two games: an ancient strategy game, and a simulation of torpedo warfare waged on the Hi-Res seas. (Requires paddles or joystick.)

Order No. **G14** Electric Arcade **$19.95**

NEW! NIBBLE GAME ROOM

■ **Chinese Checkers** brings an adaptation of the classic strategy game to your Apple. Play against a tough computer opponent on a colorful Hi-Res game board. Can you outwit your Apple and get your marbles across the board first?

■ **Connection** is a game that challenges you to compete against your Apple for territory on the

PRODOS LIBRARY 3

■ **Display** makes your ProDOS VAR files work for you! It looks into the VAR files on your disks, and lists the names and values of all real, integer and string variables in your Applesoft programs. An excellent tool for debugging; to efficiently initialize program variables; or to preserve the current state of a program while it carries out another task.
■ **Disk Librarian Pro** catalogs all your disks and instantly creates a quick-reference master list. Wondering which of a dozen disks holds the file you want now? Disk Librarian Pro has the answer! It reads and stores the catalog information, and records whether it's a DOS 3.3, Pro-DOS or Pascal disk. You can display, sort and print hundreds of file names. The master list can even be transferred into AppleWorks!
■ **Expanded ProDOS Catalog** displays all of the files on a ProDOS formatted disk — no matter how deeply they are buried in subdirectories. You can even start at a chosen subdirectory level and retrieve all of the file names below that level.

Order No. **QO5** ProDOS Library 3 **$26.95**

ALL ABOUT DISKS

DISK FIXER

The right tools for fixing disk problems.

■ **Disk MAP System** is a road map to your DOS 3.3 disks, showing you the exact location of your files and how much space they occupy. You can display and verify every sector on the disk, or to display a list of sectors used by a particular file. Automatic sector verification lets you know if some sectors are damaged, indicating that repair is needed. Documentation includes hints for fixing damaged disks.
■ **Disk MAP II** uses a snapshot method to instantly display a complete map of the disk, including all of the occupied and free sectors, on just one screen. The display includes a code to the names of the files, so you can see exactly where your files reside on the disk. You can send the map to the printer for closer study.
■ **Disk Zap** zooms in to directly read the contents of a disk sector and display it on the screen in hexadecimal and ASCII format. You can then review, edit and print out the sector's data, and "zap" the disk by writing the modified contents back onto the disk. Simple, one-key commands let you step backward and forward to view the next or previous sectors. Or Have fun by creating hidden file names, modifying DOS and more! Includes detailed instructions for repairing a variety of disk problems.
■ **Disk Doctor** finds the cure for sick disks. It recovers accidentally deleted files — automatically! There's also an option that lets you remove DOS from your disks, creating unbootable data disks that let you store an additional 32 sectors of information — over 8,000 bytes!

Order No. **D02** Disk Fixer **$22.95**

DISK LIBRARIAN

A complete library of powerful disk utilities.

■ **Disk Librarian Pro** catalogs all your disks and instantly creates a quick-reference master list. Wondering which of a dozen disks holds the file you want now? Disk Librarian Pro has the answer! It reads and stores the catalog information, and records whether it's a DOS 3.3, Pro-DOS or Pascal disk. You can display, sort and print hundreds of file names. The master list can even be transferred into AppleWorks!
■ **Sector Stretcher** gives your data room to grow. It clears up to 45 extra sectors, stretching the capacity of every DOS 3.3 disk you own. Perfect for database users who've seen the DISK FULL error message much too often.
■ **RAM Disk II** ends the disk shuffle. It adds a 16K electronic RAM disk to your system. Now you can store frequently-used utilities on a RAM disk tucked inside Apple memory. You get faster access and all disk commands work the same as with your regular DOS 3.3 disks.
■ **Diskoverer** is a fast, powerful DOS 3.3 disk zap program. Use it to rescue your damaged disks or inspect file formats. A range of features let you read from, display and write to any sector, in any of three ASCII formats. Diskoverer lets you easily page through a file, then change data or disassemble any portion of a sector.

Order No. **D06** Disk Librarian **$29.95**

–Programming– Productivity

MACHINE LANGUAGE MASTER

Take the pain out of machine language!

■ **Machine Language Editor** makes entering and editing machine language programs as easy as using a word processor. If you make a mistake and leave out some code, Machine Language Editor lets you go back and insert the missing bytes. Or if you mistakenly insert extra characters, Machine Language Editor lets you delete them, and the rest of the program fills in the space. Imagine the time you'll save and the frustration you'll avoid. A must for your library.
■ **Hexpad** is another tool to minimize the tedium of entering lengthy machine language programs. A phantom keypad provides fast, easy entry of hexadecimal data by using 16 keys on the Apple keyboard. No more hunting and pecking through the top row of keys.
■ **ASCII.Dump** demonstrates the use of opcodes and pseudo-opcodes, and allows you to examine the Apple's memory. ASCII.Dump lets you stop, pause, restart and step through a hex dump at your own pace. It also prints the hexadecimal values of numbers stored in memory and their ASCII character equivalents.
■ **Hex Sequence Finder** makes fast searches for all occurrences of a one to fifteen-byte sequence of hexadecimal numbers in memory. Use this speedy utility to debug your machine language programs or find Applesoft and DOS commands. You specify the area of memory to be searched and Hex Sequence Finder will scan it — instantly!

Order No. **P02** ML Master **$29.95**

NEW!

APPLESOFT TOOLBOX

■ **Applesoft MatchMaker** helps you track different versions of programs you're writing, and points out the differences to make sure you're up to date.
■ **Applesoft Page Lister** provides you with an easy way to print professional-looking Applesoft listings. It makes sure that your listings don't run over the page perforations and it adds a title and page number to each page.

■ **AMPOS** gives you a quick and easy way to position the cursor and print on both the 40-column and 80-column screens. This three-parameter ampersand command also fixes a bug in some IIe 80-column cards. Stop worrying about cursor control — let one simple statement handle it all for you.
■ **Sound Master** takes advantage of the sound capabilities of your Apple II. Use it to create dazzling sound effects and perfect harmonies, without any extra hardware.
■ **Disk Drive Tester** will help you keep your 5.25-inch disk drives in top shape. The program shows you the drive speed — just follow the article's step-by-step instructions to adjust it.

Order No.: **P15** Applesoft Toolbox . . . $22.95

APPLESOFT STREAMLINER

Pare program execution time to the core!

■ **Applesoft Execution Monitor (AEM)** optimizes the performance of your Applesoft programs where they need it most. Inefficient routines can slow down your programs — even ones that appear well-structured. AEM spots the program statements that are executed most often, and prints a chart showing the relative execution frequency of each line. A powerful tool for optimizing Applesoft programs. (Requires an 80-column card and 64K of RAM.)
■ **Applesoft Line Cruncher** goes to work on your program to save memory and increase speed. This utility automatically compresses multiple Applesoft program lines, joining them wherever possible, to create compact multi-statement lines. When two lines are combined, and the savings in memory really adds up!
■ **Applesoft Anti-Line Cruncher** expands multi-statement Applesoft programs so that you can see each statement on its own line. To save time and space, "Crunch" your program; but to maintain a program with individual lines for easy readability, use the Anti-Line Cruncher.
■ **Super REM Remover** saves memory and improves execution speed by removing REMs from Applesoft programs and producing more compact code. Now you can have two versions of your program: a speedy, REM-less version and a fully documented program listing for reference.
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TYPING NIBBLE LISTINGS IN FOUR EASY STEPS

There are four main steps to typing in a program:

1. Create a work disk.
2. Type in and save the CHECKIT program.
3. Type in the listing with CHECKIT installed.
4. Save the program to disk.

STEP 1: CREATING A WORK DISK

Most *Nibble* programs work with either DOS 3.3 or ProDOS. If you have one particular program in mind, check the article for operating system compatibility.

If you are using ProDOS, copy the files PRODOS and BASIC.SYSTEM from a ProDOS master disk or from your System Utilities disk to a newly formatted disk. Apple IIGS owners should copy the file P8 from the subdirectory /SYSTEM.DISK/ SYSTEM and rename it PRODOS in addition to copying BASIC.SYSTEM.

If you choose DOS 3.3 as your operating system, first boot your DOS 3.3 system master disk, then remove the disk from the drive and follow these steps:

1. Type **NEW** and press Return.
2. Type **10 HOME** and press Return.
3. Insert a blank disk into the disk drive, type **INIT HELLO** and press Return.

STEP 2: TYPING IN CHECKIT

You're ready to type in the CHECKIT program shown on the following page. But before you type any program, clear the Apple's memory by typing NEW followed by Return. Remember, computers are very picky about how programs are typed. Be sure to type the program exactly as it is listed, including punctuation and spacing. After you've typed the program, save it on disk with the command

```
SAVE CHECKIT
```

STEP 3: USING CHECKIT TO ENTER A PROGRAM

CHECKIT watches your typing to see if you type a program line correctly. When you press Return at the end of a line, CHECKIT prints a number that will match the one published in the magazine if you've typed the line correctly. If the line is mistyped, the number printed won't match. CHECKIT runs only in the 40-column mode.

Once you've entered the CHECKIT program and saved it to disk, install it by typing

```
RUN CHECKIT
```

The first time you run CHECKIT, you may get the message "ERROR IN DATA STATEMENTS." If this occurs, recheck the data statements at and before the line listed. Correct any errors and save CHECKIT to disk before running it again.

If there are no errors in CHECKIT you'll be given the option to choose whether you'll type an Applesoft or hexadecimal listing. Some articles have more than one listing and may contain both hex and Applesoft BASIC listings. You must RUN CHECKIT before typing in each separate listing. The article will describe the listings and identify them as either hex code or Applesoft BASIC code. The following two sections describe the process of entering an Applesoft BASIC listing and a hex listing.

Applesoft Programs

If the listing you wish to enter is identified as Applesoft BASIC, answer **N** to CHECKIT's question "Are you entering a hexadecimal file?" and the Applesoft BASIC version of CHECKIT will be installed. Once it is installed, you may begin typing in the Applesoft BASIC listing. Applesoft BASIC lines listed in *Nibble* begin with a CHECKIT code, followed by a line number and the Applesoft commands. Do not type in the CHECKIT code! Type in the line number and all of the characters up to the next line number before pressing Return.

Be careful to maintain spacing between quotes. Also, avoid resetting the Apple II when CHECKIT is installed. You can omit the comments after REM statements, although they usually contain useful information when you're reading the listing.

Let's enter a sample Applesoft BASIC listing. Boot your work disk and run the CHECKIT program. Since you're not entering a hex program, answer **N** to the question asked and CHECKIT will be installed in your Apple. Now you're presented with an Applesoft BASIC prompt character and a flashing cursor. You're ready to begin typing the listing. To enter the program shown in **Example 1**, type

```
10 REM RING THE BELL
```

followed by a Return. The CHECKIT code for that line (37) will be printed if you've typed the line correctly. If the code doesn't match, type the line again, paying careful attention to detail. Now type **lines 20** and **30**. After you've typed in the entire program, enter Control-Z (hold down the Control key and press Z) for the final check code. If the code you get doesn't match the printed code, you've probably skipped a line or have an extra line in your program.

EXAMPLE 1: BASIC.PROGRAM

```
37| 10 REM RING THE BELL
54| 20 FOR J = 1 TO 5: PRINT
  |    CHR$(7): NEXT J
91| 30 END

TOTAL: 1CB9
```

Hex Programs

If the listing you wish to enter is identified as hex code, answer **Y** to the question asked by CHECKIT and the program will ask two other questions. It asks, "What is the starting address of the file?" and "What is the length of the file?" These numbers will be included at the top of the hex listings. Be sure the Caps Lock key is down when answering these questions and when entering the program. You'll have to enter the System Monitor with the command CALL −151. (The System Monitor is simply the part of your computer used for entering machine language.)

Machine language programs are published in a "hex dump" format. This means that an address is displayed followed by bytes stored in those addresses. The numbers may look unfamiliar because they are in hexadecimal (base 16) notation. For instance, in **Example 2**, the number stored in address 0300 is A2. In address 0301, the value 05 is stored.

To type in **Example 2**, you should boot your work disk and run CHECKIT. Answer **Y** to the first question asked. As you can see from the beginning of **Example 2**, the starting address is 0300 and the length is C. These numbers should be entered at the next input prompts. CHECKIT will be installed and you should see a System Monitor prompt. Now enter

```
0300:A2 05 20 DD FB CA F0 03
```

followed by a Return. The number 73 should be printed below your line. If it's not, retype the line. Now enter the second line in a similar fashion and press Control-Z for the final check code. Again, if this final number doesn't match, you've probably skipped a line in your typing.

EXAMPLE 2: HEX.PROGRAM

```
START:300                          LENGTH:C

73|0300:A2 05 20 DD FB CA F0 03
80|0308:4C 02 03 60

TOTAL: E52E
```

To check your typing by listing the program, first type the address you want to check and press Return. This will display the address and the byte entered at the address. To display a range of addresses, type the first address you'd like to see, followed by a period and the last address. For example, to see addresses 0300 to 03A0, type

```
0300.03A0
```

followed by a Return.

Special Note for IIGS owners: When displaying an area of memory, an additional number followed by a slash (/) will appear before the address in your display. To the right of the eight bytes listed in the line, there will be eight additional characters displayed. These have no relationship to the numbers produced by CHECKIT and may be ignored.

STEP 4: SAVING THE PROGRAM ON DISK

You should save the program to your work disk periodically while entering the listing and after completing a program. Saving a program on disk is simply a matter of giving the correct command. This command is always given in the article accompanying the program listings.

Technical Support

If you run into a problem with a *Nibble* program that you can't solve, send your questions and a SASE to the Nibble Technical Support Department at 52 Domino Dr., Concord, MA 01742. Phone support is available on the Tech Support line from Monday through Friday between 2 and 5 PM EST at (508) 371-1669.

Nibble Hotline

If you have a 300- or 1200-baud modem, you can reach our Nibble Hotline at (508) 369-8920. The latest errata are listed, and you can download one-liners or order Nibble/Mindcraft software. The parameters are 8 data bits, 1 stop bit, no parity, full duplex.

LISTING 1: CHECKIT

```
10  REM  ************************************
20  REM  * CHECKIT, COPYRIGHT 1988          *
30  REM  * BY MINDCRAFT PUBL. CORP.         *
40  REM  * CONCORD, MA 01742                *
50  REM  ************************************
60  TEXT : HOME : NORMAL : PRINT "CHECKIT": PRINT
     "COPYRIGHT 1988 BY MINDCRAFT PUBL. CORP."
70  ONERR  GOTO 90
80  FOR I = 0 TO 377: READ ML:CS = CS + ML: NEXT
     : RESTORE : IF CS = 48127 THEN 100
90  PRINT : PRINT "ERROR IN DATA STATEMENTS!"
     : PRINT "PROBABLY LOCATED ON OR BEFORE L
    INE "; PEEK (123) +  PEEK (124) * 256: END
100  POKE 216,0: POKE 768,0: DIM H(3):H(0) =
    1:H(1) = 16:H(2) = 256:H(3) = 4096
110  VTAB 6: PRINT "ARE YOU ENTERING A HEXADE
    CIMAL": PRINT "FILE?";: GET A$: POKE  -
    16368,0: PRINT A$
120  IF A$ = "N" OR A$ =  CHR$ (110) THEN  GOSUB
    370: POKE 34218,128: GOTO 210
130  IF A$ <  > "Y" AND A$ <  >  CHR$ (121) THEN
    110
140  POKE 768,1: VTAB 10: CALL  - 958: PRINT
    "WHAT IS THE STARTING ADDRESS OF THE": PRINT
    "FILE (IN HEX)";: INPUT H$: GOSUB 290:A = H
150  IF A < 736 OR A > 39424 THEN  PRINT : PRINT
    "INVALID ADDRESS. PLEASE DOUBLE-CHECK": PRINT
    "AND RE-ENTER": GOSUB 350: GOTO 140
160  VTAB 13: CALL  - 958: PRINT "WHAT IS THE
     LENGTH OF THE FILE": PRINT "(IN HEX)";:
     INPUT H$: GOSUB 290:B = H
170  IF B < 1 OR B > 32000 THEN  PRINT "INVAL
    ID LENGTH. PLEASE DOUBLE-CHECK": PRINT "
    AND RE-ENTER": GOSUB 350: GOTO 160
180  TEXT : HOME : NORMAL : POKE 34,1: VTAB 2
    : PRINT "INSTALLING CHECKIT..."
190  IF A >  = 6144 THEN  GOSUB 320: POKE 579
    9, INT (A / 256): POKE 5798,A - 256 *  PEEK
    (5799): POKE 5801, INT (B / 256): POKE 5
    800,B - 256 *  PEEK (5801): POKE 5802,0:
     GOTO 230: REM  ABOVE $1800 SOMEWHERE
200  IF A < 6144 THEN  GOSUB 370: POKE 34215,
     INT (A / 256): POKE 34214,A - 256 *  PEEK
    (34215): POKE 34217, INT (B / 256): POKE
    34216,B - 256 *  PEEK (34217): POKE 3421
    8,0: GOTO 210: REM  BELOW $1800 SOMEWHERE
210  IF  PEEK (48896) <  > 76 THEN  POKE 56,0
    : POKE 57,133: CALL 1002: GOTO 250
220  PRINT  CHR$ (4);"IN#A$8500": GOTO 250
230  IF  PEEK (48896) <  > 76 THEN  POKE 56,0
    : POKE 57,22: CALL 1002: GOTO 250
240  PRINT  CHR$ (4)"IN#A$1600": GOTO 250
250  TEXT : HOME : NORMAL : POKE 34,1: VTAB 2
    : PRINT "CHECKIT INSTALLED"
260  IF  PEEK (768) = 1 THEN  PRINT : PRINT "
    ENTER THE MONITOR BY TYPING": PRINT " CA
    LL -151"
270  NEW
280  END
290 H = 0:L =  LEN (H$): ON L < 1 OR L > 4 GOTO
    300: FOR I = 1 TO L:D =  ASC ( MID$ (H$,
    I,1)):H = H + H(L - I) * (D - 48 * (D <
    58 AND D > 47) - 55 * (D > 64 AND D < 71
    )): NEXT
300  RETURN
310  REM  $1600 VERSION
320  FOR I = 0 TO 377: READ ML: POKE 5632 + I
    ,ML: NEXT I:C = 5632
330  FOR I = 0 TO 18: READ ML: POKE C + ML, PEEK
    (C + ML) - 111: NEXT
340  RETURN
350  VTAB 21: PRINT "PRESS RETURN TO CONTINUE
     ";: GET CH$: PRINT CH$: POKE  - 16368,0
    : RETURN
360  REM  $8500 VERSION
370  FOR I = 0 TO 377: READ ML: POKE 34048 +
    I,ML: NEXT I
380  RETURN
390  DATA  216,32,27,253,201,154,240,31,201,1
    41,208,26,134,224,32,178,133,32,251,218,
    32,128,254,56,165,8
400  DATA  229,9,32,218,253,32,132,254,166,22
    4,169,141,96,32,106,134,44,170,133,16,43
    ,169,1,133,6,169
410  DATA  8,133,7,160,0,177,6,133,251,200,17
    7,6,133,252,240,63,200,177,6,32,79,134,2
    00,177,6,32
420  DATA  79,134,165,251,133,6,165,252,133,7
    ,208,221,173,167,133,133,7,173,166,133,1
    33,6,160,0,177,6
430  DATA  32,79,134,230,6,208,2,230,7,230,25
    1,208,2,230,252,165,251,205,168,133,165,
    252,237,169,133,144
440  DATA  227,162,0,189,171,133,32,237,253,2
    32,224,7,144,245,44,16,192,32,128,254,16
    4,8,166,9,32,64
450  DATA  249,32,251,218,32,132,254,169,152,
    96,0,0,0,0,0,20,15,20,1,12,58,32,32,106,
    134,133
460  DATA  6,169,2,133,7,160,0,177,6,201,176,
    144,73,201,186,176,69,177,6,44,170,133,1
    6,53,201,210
470  DATA  208,4,166,251,240,61,201,162,208,8
    ,72,169,1,69,251,133,251,104,201,160,208
    ,6,166,251,208,25
480  DATA  240,26,201,191,208,19,132,226,160,
    0,185,117,134,32,79,134,200,192,5,144,24
    5,164,226,176,3,32
490  DATA  79,134,200,196,224,144,188,96,166,
    224,104,104,169,141,96,132,226,136,177,6
    ,201,160,240,249,201,186
500  DATA  240,8,201,176,144,36,201,186,176,3
    2,164,226,200,177,6,201,197,208,23,200,1
    77,6,201,205,208,16
510  DATA  169,210,32,79,134,169,197,32,79,13
    4,169,205,32,79,134,96,164,226,177,6,24,
    144,135,162,8,10
520  DATA  38,8,38,9,144,14,72,165,8,73,33,13
    3,8,165,9,73,16,133,9,104,202,208,232,96
    ,169,0
530  DATA  133,8,133,9,133,251,133,252,96,208
    ,210,201,206,212
540  DATA  16,41,44,73,79,92,97,106,123,128,1
    35,180,203,246,249,261,316,321,326
```

FONT CONVERSION

Convert Publish It! fonts to system fonts and back again

One of the more popular desktop publishing programs for the Apple II is Publish It! from Timeworks, Inc. It sports a Mac-like interface that anyone can learn in under an hour, and its printer interface has no rival among present competitors. The program's primary weakness is that it comes with only six fonts. To make matters worse, Publish It! fonts appear to be nonstandard. While programs like AppleWorks GS and Medley use standard Apple IIGS system fonts, which have a $C8 filetype, Publish It! fonts have an $F7 filetype.

Even though the filetypes are different, the IIGS system fonts can be converted to the Publish It! font format and vice versa. There are many ways to accomplish the conversion, with the most drastic being the use of a block editor to change the filetype in the disk directory. This method is both dangerous and tedious. The easiest way is to use the Font Conversion Utility (FCU) program.

```
Font Conversion Utility
By: Rudy A. Guy
---------------
Copyright 1990 By MindCraft Publ. Corp.


Options
-------


1. Set Source/Destination Prefix
2. Catalog Source Disk
3. Change Publish It Font to System Font
4. Change System Font to Publish It Font
5. Exit to BASIC


Please choose:
```

Figure 1: The five-option Menu

FCU is written in Applesoft BASIC and works only in ProDOS. The program requires only one disk drive, but for optimum performance, two drives are recommended. FCU will convert most fonts, but the program size, combined with Applesoft memory restrictions, will not permit the conversion of font files larger than 25,635 bytes.

USING THE PROGRAM

If you are using a IIGS, you must make sure that Keyboard Buffering is set to No in the Control Panel under the Options page.

When FCU is run, a five-option menu is presented (**Figure 1**). You can select options from the menu with the arrow keys or by entering the desired option number and pressing Return. The first menu option permits the user to enter the prefix of the font's location.

The program will check drive 1 in slot 2 and both drives in slots 5, 6, and 7 for valid ProDOS volumes.

When all devices have been checked, the program will display a list of online prefix names. To select a prefix, use the Arrow keys to highlight the desired volume and then press Return. If the selected volume contains any subdirectories,

Rudy A. Guy, 1319 W. 10th Street, Erie, PA 16502. This program is compatible with ProDOS on the enhanced IIe, IIc, IIc+, and IIGS.

Table 1: Font Conversion's Structure

Line(s)	Function
80-280	Set up variables and display menu. Maximum number of fonts that the program will handle is 125. Change the DIM statement in line 90 to increase or decrease this number.
290-460	Get keypress and move cursor accordingly.
470-930	Set source/destination prefix.
880-910	Check for on-line volumes.
940-1030	Show catalog of source or destination drive.
1040-1060	Routine to convert Publish It! to System fonts.
1070-1090	Routine to convert System fonts to Publish It! fonts.
1100-1140	Message displayed if no font files are located in the source directory.
1150-1200	Set variables required for selected conversion.
1210-1220	Set prefix if option 1 has not been selected.
1230-1290	Read source directory and store font names in the array FT$(). CTR contains the number of font files in the directory.
1300-1350	Read the destination directory to see if a PI.FONTS or GS.FONTS folder exists.
1360-1480	Display font name and prompt user for action to be taken.
1490-1540	Create PI.FONTS or GS.FONTS folder if needed. Convert font and place in appropriate folder.
1550-1570	Exit Program. Reset original prefix.
1580	Centering routine.
1590	Data statements containing possible slot and drive locations.
1600-1770	Error handling routine for font conversion portion of the program.

they will then be displayed. The selection procedure is the same as when the root volume was selected. If no subdirectories are located on the root volume, or in subsequent subdirectories, the program will move on to the "Set Destination" routine.

The destination prefix is set in the same manner as the source prefix. When both prefixes are selected, you are asked if the prefix settings are correct. If you enter an uppercase or lowercase "N," you will be returned to the selection process.

Once the source and destination prefixes have been set, the source and destination directories may be viewed by selecting option 2 from the menu. If the prefixes were not set using option 1, the catalog option will display the files contained in the directory from which FCU was executed.

Option 3 lets you convert Publish It! fonts to GS system fonts, while option 4 converts system fonts to Publish It! fonts. When either of these two options is selected, FCU searches the source directory for the appropriate font types and displays the font names. You can convert the font, skip it, or return to the program menu.

The fonts you convert are placed into a subdirectory that is named PI.FONTS or GS.FONTS. If the destination prefix was set to /DTP/FONTS, and GS System fonts are being converted to Publish It! fonts, the converted fonts will be located at /DTP/FONTS/PI.FONTS.

Memory Restrictions

To conserve memory, error trapping has been kept to a minimum. If an error does occur during the font conversion segment of the program, the error number will appear and any conversions will be stopped. With the exception of the credit lines at the beginning of the listing, REM statements have been omitted. To see the structure of the program, refer to **Table 1.**

ENTERING THE PROGRAM

Type in the BASIC program from **Listing 1** and save it with

```
SAVE FONT.CONVERT
```

For more help with entering *Nibble* listings, see the Typing Tips section.

THE JUNE 1990 DISK CONTAINS THIS PROGRAM

If you'd rather not type in the listing for this program, you can buy it on disk, complete, free of typos and ready to run. *Nibble*'s June 1990 programs are available on a single disk for an introductory price of $12.95 from *Nibble*, 52 Domino Dr., Concord, MA 01742. Add $2.50 for shipping/handling within the U.S. and Canada; $7.50 for overseas air mail. Introductory price expires 8/31/90; after that date, the price will be $16.95. See the Nibble Software Directory in this issue for ordering information. **ORDER NO.: W32**

LISTING 1: FONT.CONVERT

```
37 | 10  REM ******************************
C0 | 20  REM * FONT.CONVERT                *
B9 | 30  REM * BY RUDY A. GUY              *
AE | 40  REM * COPYRIGHT(C) 1990           *
CB | 50  REM * MINDCRAFT PUBL. CORP.        *
24 | 60  REM * CONCORD, MA 01742           *
45 | 70  REM ******************************
9B | 80  ONERR  GOTO 1600
D0 | 90  DIM FT$(125),PF$(55)
94 | 100 D$ =  CHR$ (4):EC = 1
5E | 110  FOR I = 1 TO 7: READ S(I),D(I): NEXT
A6 | 120  PRINT D$"PREFIX": INPUT P1$
0D | 130  PRINT D$"PR#3"
CD | 140  HOME : PRINT : VTAB 1:EC = 0
06 | 150 A$ = "Font Conversion Utility": GOSUB 1580
03 | 160 A$ = "By: Rudy A. Guy": GOSUB 1580
7A | 170 A$ = "---------------": GOSUB 1580
9C | 180 A$ = "Copyright 1990 By MindCraft Publ. Cor
     p.": GOSUB 1580
06 | 190  VTAB 8:A$ = "Options": GOSUB 1580
9C | 200 A$ = "-------": GOSUB 1580
3D | 210  VTAB 11: POKE 1403,20: PRINT "1. Set Sourc
     e/Destination Prefix"
F5 | 220  POKE 1403,20: PRINT "2. Catalog Source Dis
     k";: IF  LEN (P3$) = 0 THEN  PRINT : GOTO 2
     40
FC | 230  PRINT "/Destination Disk"
71 | 240  POKE 1403,20: PRINT "3. Change Publish It
     Font to System Font"
2A | 250  POKE 1403,20: PRINT "4. Change System Font
      to Publish It Font"
29 | 260  POKE 1403,20: PRINT "5. Exit to BASIC"
E6 | 270  VTAB 17: POKE 1403,20: PRINT "Please choos
     e:"
1A | 280  POKE  - 16368,0:S = 1: GOSUB 390
76 | 290 X =  PEEK ( - 16384): IF X = 141 THEN  GOSU
     B 420: GOTO 440
B2 | 300  IF X = 138 OR X = 149 THEN  GOSUB 340: GOT
     O 290
31 | 310  IF X = 136 OR X = 139 THEN  GOSUB 360: GOT
     O 290
5F | 320  IF X > 176 AND X < 182 THEN  GOSUB 380:
     GOTO 290
33 | 330  GOTO 290
53 | 340  GOSUB 420: IF S = 5 THEN S = 1: GOSUB 390:
     RETURN
```

```
7E  350 S = S + 1: GOSUB 390: RETURN
CB  360  GOSUB 420: IF S = 1 THEN S = 5: GOSUB 390:
    RETURN
77  370 S = S - 1: GOSUB 390: RETURN
54  380  GOSUB 420:S = X - 176: GOSUB 390: RETURN
28  390 S$ =  STR$ (S) + ".": INVERSE : VTAB 10 + S
    : POKE 1403,20
75  400  INVERSE : PRINT S$: NORMAL
17  410  VTAB 17: POKE 1403,34: PRINT S: RETURN
69  420  POKE  - 16368,0:S$ =  STR$ (S) + ".": VTAB
    10 + S: POKE 1403,20: PRINT S$: RETURN
26  430  VTAB 17: POKE 1403,34: PRINT S - 1: RETURN

32  440  IF S = 5 THEN  GOTO 1550
78  450  ON S GOTO 470,940,1040,1070
0C  460  GOTO 140
10  470  HOME :A$ = "Set Source Prefix": VTAB 1:
    GOSUB 1580
B8  480 EC = 2:TT = 1: GOTO 880
71  490  GOSUB 680:TP$ = PF$(VT - 4): IF TP$ = "ABO
    RT" THEN  PRINT D$"PREFIX"P1$: GOTO 140
81  500  VTAB 3: PRINT "Source Prefix:"TP$
A4  510  VTAB 5: CALL  - 958: GOSUB 800: IF K > 0
    THEN  GOSUB 680:TP$ = PF$(VT - 4)
5D  520  IF TP$ = "ABORT" THEN  PRINT D$"PREFIX"P1$
    : GOTO 140
3D  530  IF  LEFT$ (TP$,2) = "AC" OR K = 0 THEN
    PRINT D$"PREFIX": INPUT P2$: GOTO 550
07  540  IF K > 0 THEN 510
B7  550  HOME :A$ = "Set Destination Prefix": VTAB
    1: GOSUB 1580
EC  560 TT = 2: GOTO 880
FF  570  GOSUB 680:TP$ = PF$(VT - 4): IF TP$ = "ABO
    RT" THEN  PRINT D$"PREFIX"P1$:P2$ = "": GOT
    O 140
01  580  VTAB 3: PRINT "Destination Prefix:"PF$
14  590  VTAB 5: CALL  - 958: GOSUB 800: IF K > 0
    THEN  GOSUB 680:TP$ = PF$(VT - 4)
62  600  IF TP$ = "ABORT" THEN  PRINT D$"PREFIX"P1$
    : GOTO 140
E1  610  IF  LEFT$ (TP$,2) = "AC" OR K = 0 THEN
    PRINT D$"PREFIX": INPUT P3$: GOTO 630
EA  620  IF K > 0 THEN 590
13  630  HOME : VTAB 5: INVERSE : PRINT "Source Dri
    ve:": NORMAL : PRINT : PRINT P2$
BD  640  VTAB 10: INVERSE : PRINT "Destination Driv
    e:": NORMAL : PRINT : PRINT P3$
09  650  VTAB 22: INPUT "Are these correct?";YN$: I
    F  LEFT$ (YN$,1) = "y" OR  LEFT$ (YN$,1) =
    "Y" THEN  GOTO 140
31  660  IF  LEFT$ (YN$,1) = "n" OR  LEFT$ (YN$,1)
    = "N" THEN 470
F6  670  PRINT  CHR$ (7): GOTO 630
16  680  VTAB 5: CALL  - 958: FOR I = 1 TO K: POKE
    1403,20: PRINT PF$(I): NEXT
20  690 VT = 5:HT = 20: INVERSE : VTAB VT: POKE 140
    3,HT: PRINT PF$(VT - 4): NORMAL
0D  700 X =  PEEK ( - 16384): IF X = 141 THEN  POKE
     - 16368,0: RETURN
0F  710  IF X = 138 OR X = 149 THEN  POKE  - 16368,
    0: VTAB VT: POKE 1403,HT: PRINT PF$(VT - 4)
    : GOTO 740
D7  720  IF X = 136 OR X = 139 THEN  POKE  - 16368,
    0: VTAB VT: POKE 1403,HT: PRINT PF$(VT - 4)
    : GOTO 770
45  730  GOTO 700
77  740  IF VT = K + 4 THEN VT = 5: GOTO 760
11  750 VT = VT + 1
86  760  INVERSE : VTAB VT: POKE 1403,HT: PRINT PF$
    (VT - 4): NORMAL : GOTO 700
5B  770  IF VT = 5 THEN VT = K + 4: GOTO 790
67  780 VT = VT - 1
C5  790  INVERSE : VTAB VT: POKE 1403,HT: PRINT PF$
    (VT - 4): NORMAL : GOTO 700
BD  800 K = 0: PRINT D$"PREFIX"TP$: PRINT D$"PREFIX
    ": INPUT TP$: ON TT GOTO 810,820
B9  810  VTAB 3: PRINT "Source Prefix:"TP$: GOTO 83
    0
F9  820  VTAB 3: PRINT "Destination Prefix:"TP$
1B  830  PRINT D$"OPEN "TP$",TDIR": PRINT D$"READ "
    TP$
79  840  INPUT T$: IF  MID$ (T$,18,3) = "DIR" THEN
    K = K + 1:PF$(K) =  MID$ (T$,2,16): GOTO 84
    0
57  850  IF  LEFT$ (T$,2) <  > "BL" THEN 840
68  860  PRINT D$"CLOSE": IF K = 0 THEN  RETURN
B8  870 PF$(K + 1) = "ACCEPT CURRENT PREFIX":PF$(K
    + 2) = "ABORT":K = K + 2: RETURN
3C  880 K = 0:I = 0
EC  890 I = I + 1
09  900  PRINT D$"PREFIX,S"S(I)",D"D(I):K = K + 1:
    PRINT D$"PREFIX": INPUT PF$(K)
F8  910  IF I < 7 THEN 890
EF  920 K = K + 1:PF$(K) = "ABORT"
E0  930  ON TT GOTO 490,570
F8  940 EC = 3: HOME : IF  LEN (P3$) = 0 THEN  PRIN
    T D$"CATALOG": GOTO 1000
F6  950  VTAB 12: PRINT "(S)ource or (D)estination
    drive ?"
00  960 X =  PEEK ( - 16384): IF X = 155 THEN  POKE
     - 16368,0: RETURN
F7  970  IF X = 211 OR X = 243 THEN  POKE  - 16368,
    0: PRINT D$"CATALOG"P2$: GOTO 1000
3D  980  IF X = 196 OR X = 228 THEN  POKE  - 16368,
    0: PRINT D$"CATALOG"P3$: GOTO 1000
4E  990  GOTO 960
57 1000  POKE  - 16368,0
0F 1010  VTAB 24: PRINT "Press RETURN for the menu
    .";
F6 1020 X =  PEEK ( - 16384): IF X = 141 THEN  POK
    E  - 16368,0: GOTO 140
B9 1030  GOTO 1020
B5 1040 FL = 0:CTR = 0:CVR = 1
BE 1050  GOSUB 1150: GOSUB 1210: GOSUB 1360
25 1060  GOTO 140
CF 1070 FL = 0:CTR = 0:CVR = 2
58 1080  GOSUB 1150: GOSUB 1210: GOSUB 1360
D2 1090  GOTO 140
E4 1100  HOME : VTAB 12:A$ = "No " + M2$ + " fonts
    found.": GOSUB 1580
E0 1110  VTAB 23: PRINT "Press any key for the men
    u."
9B 1120  POKE  - 16368,0
1B 1130 X =  PEEK ( - 16384): IF X > 127 THEN  POK
    E  - 16368,0: GOTO 140
AE 1140  GOTO 1130
C2 1150  ON CVR GOSUB 1170,1190
7B 1160  RETURN
45 1170 T1$ = "$F7":T2$ = "$C8":F1$ = "GS.FONTS":F
    2$ = "PI.FONTS":M1$ = "System":M2$ = "Publi
    sh.It"
5C 1180  RETURN
01 1190 T1$ = "$C8":T2$ = "$F7":F1$ = "PI.FONTS":F
    2$ = "GS.FONTS":M1$ = "Publish.It":M2$ = "S
    ystem"
6F 1200  RETURN
DE 1210  IF  LEN (P2$) = 0 THEN P2$ = P1$
05 1220  IF  LEN (P3$) = 0 THEN P3$ = P2$
F6 1230  HOME : VTAB 12:A$ = "Please wait. Reading
    directory.": GOSUB 1580
2C 1240  PRINT D$"OPEN "P2$",TDIR": PRINT D$"READ
    "P2$
8B 1250  INPUT A$
38 1260  IF  MID$ (A$,18,3) = T1$ THEN CTR = CTR +
    1:FT$(CTR) = A$
BC 1270  IF  LEFT$ (A$,1) = "B" THEN 1290
34 1280  GOTO 1250
5E 1290  PRINT D$"CLOSE"
38 1300  PRINT D$"OPEN "P3$",TDIR": PRINT D$"READ
    "P3$
5F 1310  INPUT A$: IF  MID$ (A$,2,8) = F1$ THEN F1
    = 1
73 1320  IF  LEFT$ (A$,1) = "B" THEN 1340
F0 1330  GOTO 1310
4A 1340  PRINT D$"CLOSE"
1A 1350  RETURN
A0 1360  HOME
77 1370  IF CTR = 0 THEN  POP : GOTO 1100
D1 1380  FOR I = 1 TO CTR: VTAB 12: PRINT "Convert
    ";: INVERSE : PRINT  MID$ (FT$(I),2,16);:
    NORMAL : PRINT " to a "M1$" font?"
8B 1390  VTAB 23: PRINT "<ESC> for menu, <SPACE> t
    o skip, <RETURN> to convert."
31 1400  GOSUB 1430
C5 1410  NEXT I
F0 1420  PRINT D$"PREFIX"P2$: RETURN
85 1430  POKE  - 16368,0
80 1440 X =  PEEK ( - 16384)
```

LISTING 1: FONT.CONVERT *continued*

```
1F | 1450  IF X = 155 THEN  POKE  - 16368,0:I = CTR:
       RETURN
0B | 1460  IF X = 160 THEN  POKE  - 16368,0: RETURN

E5 | 1470  IF X = 141 THEN  POKE  - 16368,0: GOTO 14
       90
01 | 1480  GOTO 1440
09 | 1490  IF F1 = 1 THEN 1510
83 | 1500  PRINT D$"CREATE "P3$;F1$:F1 = 1
93 | 1510  PRINT D$"BLOAD "P2$; MID$ (FT$(I),2,16)",
       T"T1$",A$2200"
53 | 1520  PRINT D$"CREATE "P3$;F1$"/" MID$ (FT$(I),
       2,16)",T"T2$
68 | 1530  PRINT D$"BSAVE "P3$;F1$"/" MID$ (FT$(I),2
       ,16)",T"T2$",A$2200,L" MID$ (FT$(I),67,5)
78 | 1540  HOME : RETURN
28 | 1550  HOME : VTAB 12: INPUT "Are you sure you w
       ant to quit?";YN$
F9 | 1560  IF  LEFT$ (YN$,1) = "y" OR  LEFT$ (YN$,1)
       = "Y" THEN  PRINT D$"PREFIX"P1$: TEXT :
       HOME : END
13 | 1570  HOME : GOTO 140
77 | 1580 HT = 40 -  LEN (A$) / 2: POKE 1403,HT:
       PRINT A$: RETURN
6C | 1590  DATA  2,1,5,1,5,2,6,1,6,2,7,1,7,2
8C | 1600 ER =  PEEK (222):EL =  PEEK (218) +  PEEK
       (219) * 256
AE | 1610  IF (ER = 8 OR ER = 3) AND EC = 2 THEN I =
        I + 1: RESUME
D2 | 1620  IF ER = 2 AND EC = 2 THEN 910
29 | 1630  HOME : VTAB 12
A6 | 1640  IF (ER = 8 OR ER = 3) AND EC = 3 THEN 173
       0

DE | 1650  IF EC = 1 AND ER = 8 THEN  PRINT "Please
       close your drive door.": VTAB 23: PRINT "Pr
       ess a key to continue.": GOTO 1710
EC | 1660  IF EC = 2 AND ER = 6 THEN  PRINT "Please
       place ";: INVERSE : PRINT P1$;: NORMAL :
       PRINT " in any drive.": GOTO 1710
2D | 1670  PRINT "An error has occurred in line "EL"
       ."
1C | 1680  PRINT "The error code is "ER"."
74 | 1690  PRINT "Please refer to your ProDOS and Ap
       plesoft manual."
B0 | 1700  VTAB 23: PRINT "Press a key for the main
       menu."
89 | 1710 X =  PEEK ( - 16384): IF X > 127 THEN  POK
       E  - 16368,0: PRINT D$"Prefix"P1$: RUN
B1 | 1720  GOTO 1710
57 | 1730  PRINT "Please check your drive door and m
       ake sure that the correct disks are inserte
       d  in your drives."
FB | 1740  VTAB 23: PRINT "Press <ESC> for menu. Pre
       ss any other key to try again."
2E | 1750 X =  PEEK ( - 16384): IF X = 151 THEN  POK
       E  - 16368,0: PRINT D$"PREFIX"P1$: RUN
02 | 1760  IF X > 127 THEN  POKE  - 16368,0: GOTO 94
       0
1F | 1770  GOTO 1750
```

TOTAL: 5DCB

END OF LISTING 1

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PRODUCTS & SERVICES INDEX

Circle #	Company Name	Page #
3	Abby's Discount Software	29
200	Abracadata	96
104	Addison-Wesley Publishing Co.	35
152	Apple Computer, Inc.	14
159	Apple Fiesta	90
*	Applied Engineering	C2, 3
*	Applied Engineering	7, 9
103	Beagle Bros	35
4	Byte Works, Inc	39
155	Chinook Technology	15
102	Claris Corp	34
2	Co-Du-Co	25
9	Computer Direct, Inc.	81
1	Illyes Systems	23
11	Ingenuity, Inc.	89
29	International Software Library	93
121	Kyodai	12
157	Methods & Solutions	15
5	MicroGram	44
122	Microillusions	12
*	MindCraft Publishing Corp.	12, 28, 52
*	MindCraft Publishing Corp.	80, 82, C3
158	National Apple Users Group	90
120	New World Computing	11
26, 27	Nexo Distribution	92
*	Nibble	
	Disk Subscription	8
	Disassembly Lines	35
	Express Volumes	94-95
	Express X	76
	Nibble Library	16-17
	Software Directory	61-70
	Subscription	4
	Third Book of Apple Secrets	79
	Two Minute Apple Programs	57
	Your Apple Games Gallery II	87
151	Northgate Computer Systems	14
28	Perfect Solutions Software	92
*	Preferred Computing	13
8	Programs Plus	46-49
160	Quantum Computer Services, Inc.	90
6	Ramco Ribbon, Inc.	44
153	Scholastic, Inc.	14
101	Sensible Software, Inc.	34
105	Sensible Software, Inc.	35
25	SoftSpoken	92
*	SPA	C4
10	Stone Edge Technologies, Inc.	88
156	Stone Edge Technologies, Inc.	15
154	Sunburst Communications	15
7	Thunderware, Inc.	45
150	Timeworks	14

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Article	Article #
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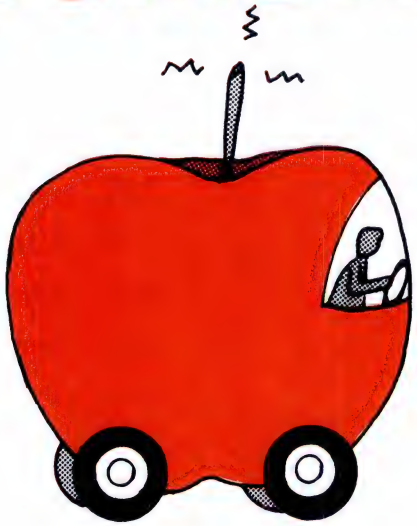
Spelling & Grammar Checkers: Frank Dooling	3
Switched on Graphics: David Harris	4
Smart Color Fill: Brent Iverson	5
Poking Dynamic Displays: George Tylutki	6
HexPad: Mark A. Heath	7
Font Conversion Utility: Rudy Guy	8
Odometer: Matt Cox	9
Shapiro on Games	10
Editors' Spotlight/Landscape	11
One-Liner and Two-Liner Winners	12
On the Scene: Arthur S. Luckower	13
Raw Data: Rich Williams	14
Viewpoint: Mike Harvey	15
Ask Nibble: Roger Wagner	16

by Matt Cox

ODOMETER

Put some miles on your Apple



A car is a major investment. Many people spend more for automobiles in their lifetime than they do for housing. After spending a large sum, you have many other operating, maintenance, and insurance expenses over the years. Did you ever wonder how much your car costs you? Odometer helps you answer this question.

Odometer tracks operating costs and mileage for one or more cars. Several reports let you know the operating cost per mile and average miles per gallon (MPG) for each car.

USING THE PROGRAM

When you run the program, you will be faced with the main menu. Move the menu cursor with the arrow keys and press Return to make your selection.

If you are using the program for the first time, choose the third option, Configure/ Start or Delete. This menu has four choices. Choose the configure option. Enter Y if you have a printer and Y again if you have 80-column capability. If you don't have a printer or 80-column card, enter N for both. Press Return to accept the default value displayed at the cursor.

Matt Cox, 7 Harmon Place, New City, NY 10956. *This program is compatible with DOS 3.3 and ProDOS on the enhanced IIe, IIc, IIc+, and IIGS.*

After you configure the program, you must enter information about your car. First enter the car name. If it already exists on the disk, you will be told so and given options to abort the operation or replace the original data. The name of your car can contain up to 11 characters (but they must all be valid ProDOS characters).

Once you've entered your car's name, you must enter the current mileage on its odometer. You should enter this when you have a full tank of gas. This will ensure that all future mileage calculations will be accurate. All future mileage entries should come from the car's trip odometer, which must be reset to zero each time you buy gas. You can include up to six cars.

Your next step is to enter data. The car you most recently used will be the car you enter data for. (If you wish to change cars, use the main menu's Select Car option.)

On the data entry screen, underscores show you each item's maximum length. When

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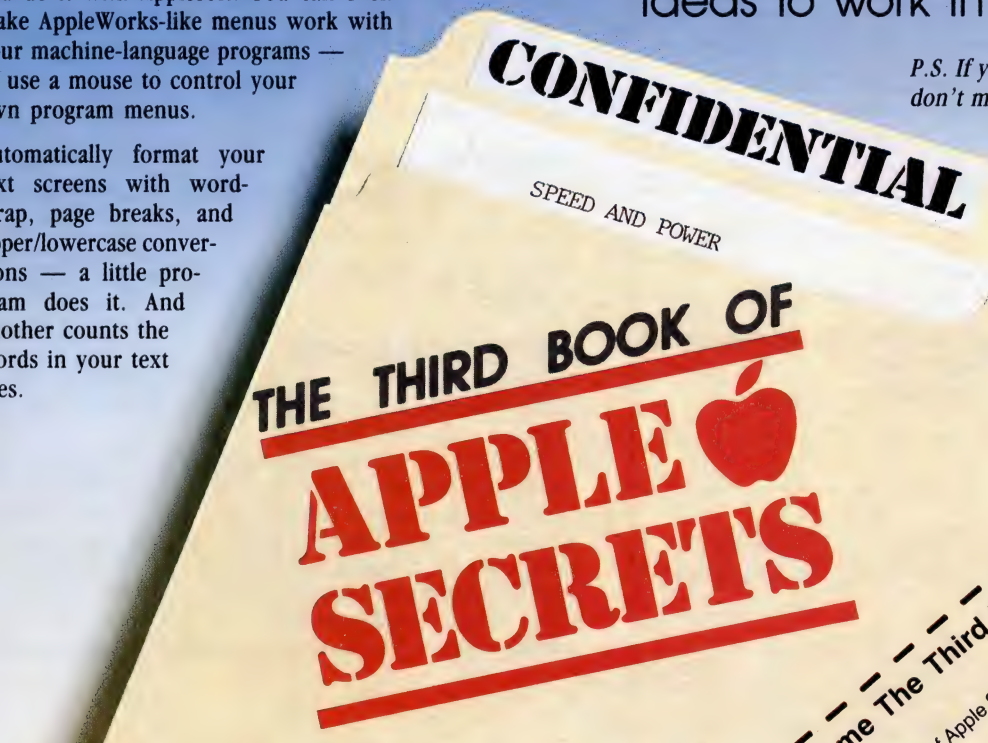

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entering data, press the Return key to move on to the next field. Pressing Control-S will accept the data you entered.

The first item you enter is the transaction type. There are two categories. The first, Gas Fill Up, requires that you enter the date, miles on trip odometer at the time of fill-up, and the quantity (in gallons) of gas. You can also include comments.

The second category, Any Other Expense, gives you space to enter all other operating costs of your automobile and comments relating to the payment. These may include oil, maintenance, insurance, monthly payments, lease payments, depreciation, and so on. You must also enter the date.

You may enter M to get back to the main menu.

The date field is eight characters long. Enter the date in the mm/dd/yy format. You can enter the month or day as one digit, but all three items must be entered and separated by slashes (/) only. A beep will sound if your input is unsatisfactory.

The amount of transaction is the total cost of the items involved. It can be eight characters long. If you got whatever you got for free (your uncle owns a gas station), enter 0 — don't just press Return.

The comment field is 20 characters long. Include any comments you find relevant. All characters, including the colon and comma, are "legal" in this particular field.

After all the data is entered, you will be back up at the date field again. If everything is correct, press Control-S and it will be saved to disk.

Once you have entered some data, you will want to create some reports. Three are available: Cost & Mileage, Mileage alone, and Cost alone.

The Cost & Mileage report displays the records for any single year (or all years) and shows you miles per gallon, cost per mile (for each fill-up at total), the current odometer reading, your comments, and totals and averages for everything. You must have an 80-column card or a printer to get this report. The mileage report shows miles, gallons, and MPG, and the cost report shows dates, costs, and comments.

The program's last option is car deletion. To delete a car, select the third menu option, choose the delete option, choose the car you want to delete, and confirm the action when the program asks.

ENTERING THE PROGRAM

Type in the program from **Listing 1** and save it with

```
SAVE APPLE.ODOMETER
```

For more help with entering *Nibble* listings see the Typing Tips section.

HOW THE PROGRAM WORKS

I set the data file's record length to 55 bytes. This is a little more than you need, but it provides a margin for expansion or modification.

The program creates three files. The first is the system configuration file, which contains the printer slot, 80-column card slot, and 80-column to 40-column control code. The second file is the Names file, which keeps track of the names of the cars on file. Finally, each car has a file. Record 0 contains the starting mileage and the number of entries. Each other record contains a transaction. This file is a random-access file; the other two are sequential files.

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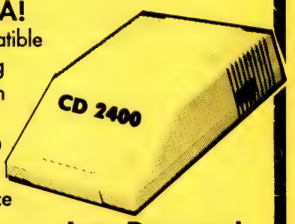

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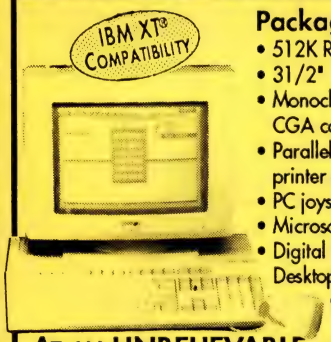

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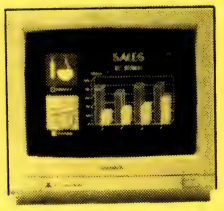

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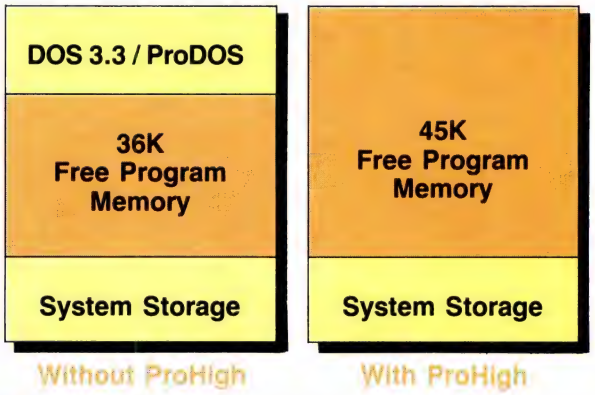

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Table 1: Program Routines

Line#	Purpose
80-140	Define variables & the main menu
150-210	Start transaction entry, define variables, read files
220-270	Set up entry screen
280-350	Start entry, get transaction type
370-540	Enter expense only
380-450	Enter date
460-500	Enter amount
510-530	Enter comments
560-630	Enter date
640-700	Enter amount
710-740	Enter miles
750-780	Enter gallons
790	Calculate and display MPG
800-820	Enter comments
850-870	Write disk file, clear variables, go to menu
890-900	Trap errors, quit if recovery not available
940-2380	REPORTS
910-920	Read & set up configuration file
930-960	Check to make sure car has data, do menu
980-1510	Cost & mileage report
1020-1080	Get ouput mode and year to print for
1090-1110	Print headings
1120-1240	Display each entry and total some columns
1310-1320	End report, calculate averages
1330-1340	Finish up, turn off printer/80-column card
1350-1370	Do expense-only output
1380	Get output type
1390-1720	Format output routines
1410-1460	Format date
1470-1510	Format miles
1520-1560	Format gallons
1570-1630	Format & calculate MPG
1640-1690	Format amount
1700-1770	Format & calculate cost per mile
1780-1970	Mileage report
1800-1810	Get output type
1840-1850	Print headings
1870-1920	Print each record, total up miles & gallons
1940-1950	Calculate totals & averages, finish report
1960-1970	Finish up, turn off printer
1980-2190	Cost report
1990-2030	Get output type
2040-2050	Print headings
2060-2180	Get & print each record, total cost
2200-2210	Error trapping for all reports
2220-2880	CONFIGURE/START/DELETE
2230-2240	Menu & titles
2260-2410	Configure system
2430-2790	Start new car
2800-2990	Delete a car
3000-3040	SELECT A CAR
3050-3060	Routine to read configuration file
3100	Routine to exit gracefully
3110-3510	MAIN SUBROUTINES (called often)
3490	Center line
3280-3300	Routine to print title on top of screen
3330-3460	Line input routine
3470	Yes/No/Menu question
3490-3510	Error Trapping (Control-C check) and Exit

The program contains many routines that will be useful in other programs; **Table 1** lists all the routines and subroutines. The most useful has to be the menu routine in **lines 3150-3270**. Set the variable NC to the number of choices, the elements of the array CH$() to the name of each choice, and call the routine. The routine returns the value of the

choice taken in the variable C. If you choose the top entry, for instance, C will contain 1. **Line 3140** contains a routine to center a line on the screen. Just set A$ equal to the line you want centered, and GOSUB to the routine. The line will be printed at the current vertical cursor position.

In **lines 3320-3440**, you'll find a routine that allows you to define the maximum length of an input string (to a maximum of 255). Set LN equal to the length of the string, A$ equal to the prompt, VP equal to the vertical position, and call the routine. Arrows are printed around the area where the string is to be entered. For instance, if A$="ENTER NAME" and LN=15, you will see on the screen:

```
ENTER NAME ->                <-
```

You can also call this routine at **line 3330** if you don't want the arrows and prompt to appear. Just set VP and LN like before, and set HP to the horizontal position on the screen. This is what I did in the transaction entry routine.

THE JUNE 1990 DISK CONTAINS THIS PROGRAM

If you'd rather not type in the listing for this program, you can buy it on disk, complete, free of typos and ready to run. *Nibble*'s June 1990 programs are available on a single disk for an introductory price of $12.95 from *Nibble*, 52 Domino Dr., Concord, MA 01742. Add $2.50 for shipping/handling within the U.S. and Canada; $7.50 for overseas air mail. Introductory price expires 8/31/90; after that date, the price will be $16.95. See the Nibble Software Directory in this issue for ordering information. ORDER NO.: W32

LISTING 1: APPLE.ODOMETER

```
37 | 10  REM   ******************************
C0 | 20  REM   * APPLE.ODOMETER               *
B9 | 30  REM   * BY MATT COX                  *
AE | 40  REM   * COPYRIGHT(C) 1990            *
CB | 50  REM   * MINDCRAFT PUBL. CORP.        *
24 | 60  REM   * CONCORD, MA 01742            *
45 | 70  REM   ******************************
9F | 80  PRINT  CHR$ (21):D$ =  CHR$ (4): DIM LN$(25
   |     )
71 | 90  ONERR  GOTO 870
E4 | 100  PRINT D$"VERIFY CAR.NAMES"
2E | 110  ONERR  GOTO 3480
1F | 120  HOME :DN = 0:B$ = "BY MATT COX": GOSUB 328
   |     0: VTAB 5: HTAB 6: PRINT "(C) 1990 MINDCRAF
   |     T PUBL. CORP."
DB | 130 CH$(1) = "ENTER MILEAGE/EXPENSE":CH$(2) = "
   |     PRINTED REPORTS MENU":CH$(3) = "CONFIGURE S
   |     YSTEM/START OR DELETE CAR":CH$(4) = "SELECT
   |      A  CAR":CH$(5) = "EXIT  PROGRAM":NC = 5:
   |     GOSUB 3150
CC | 140  ON C GOTO 150,890,2220,2960,3100
29 | 150  ONERR  GOTO 870
53 | 160 FL = 0:CO$ = "":AM$ = "":GL$ = "":MI$ = "":
   |     DT$ = ""
A6 | 170  POKE 34,23
D6 | 180  TEXT
12 | 190  IF NC$ = "" THEN RT = 1: GOSUB 2960
C5 | 200 B$ = "ENTER FILL-UP/EXPENSES": GOSUB 3280
E9 | 210  POKE 34,23: PRINT D$;"OPEN CAR.";NC$;",L55
   |     ": PRINT D$;"READ CAR.";NC$;",R0": INPUT A$
   |     ,NE: PRINT D$;"CLOSE CAR.";NC$: TEXT
BF | 220  INVERSE : FOR X = 1 TO 40: VTAB 8: HTAB X:
   |     PRINT " ";: VTAB 22: HTAB X: PRINT " ";:
   |     NEXT X
51 | 230  FOR X = 8 TO 21: VTAB X: PRINT " ";: NORMA
   |     L : HTAB 40: INVERSE : PRINT " ": NEXT X:
   |     NORMAL
C6 | 240 A$ = NC$: VTAB 7: GOSUB 3110
EF | 250  VTAB 7: PRINT "ENTRY # ";NE + 1: VTAB 10:
   |     HTAB 3: PRINT "ENTRY TYPE ";:NU = 1: GOSUB
   |      3310: VTAB 10: HTAB 25: PRINT "DATE ";:NU
   |     = 8: GOSUB 3310: VTAB 11: HTAB 13: PRINT "
   |     AMOUNT ";:NU = 8: GOSUB 3310: VTAB 15: HTAB
   |      3: PRINT "MILES ON LAST TANK ";:NU = 6:
   |     GOSUB 3310
EE | 260  VTAB 16: HTAB 3: PRINT "GALLONS TAKEN ";:N
   |     U = 5: GOSUB 3310: HTAB 28: INVERSE : PRINT
   |      "MPG:": NORMAL : VTAB 20: HTAB 6: PRINT "C
   |     OMMENTS ";:NU = 20: GOSUB 3310: PRINT : VTA
   |     B 13: INVERSE : FOR X = 1 TO 39: PRINT " ";
   |     : NEXT X: VTAB 17: FOR X = 1 TO 40: PRINT "
   |      ";: NEXT X: NORMAL
1C | 270  POKE 34,22: HOME : TEXT : VTAB 23: HTAB 2:
   |     PRINT "ENTER: 1-GAS FILL UP";: HTAB 29:
   |     PRINT "M-MAIN MENU": VTAB 24: HTAB 9: PRIN
   |     T "2-ANY OTHER EXPENSE";
48 | 280  VTAB 10: HTAB 14: GET I$: PRINT I$
69 | 290  IF I$ = "1" OR I$ = "2" OR I$ = "M" THEN 3
   |     10
95 | 300  PRINT  CHR$ (7): GOTO 280
B0 | 310  POKE 34,22: HOME : TEXT : VTAB 23: HTAB 3:
   |     PRINT "<";: INVERSE : PRINT "RETURN";:
   |     NORMAL : PRINT "> TO VERIFY  <";: INVERSE
   |     : PRINT "ESC";: NORMAL : PRINT "> TO CORREC
   |     T": WAIT  - 16384,128:A =  PEEK ( - 16384):
   |     POKE  - 16368,0: IF A - 128 = 13 THEN 340
B8 | 320  IF A - 128 <  > 27 THEN 310
25 | 330  GOTO 270
46 | 340  IF I$ = "M" THEN 120
03 | 350  ON  VAL (I$) GOTO 550,370
51 | 360  PRINT  CHR$ (7): GOTO 270
4A | 370 TY = 2
A6 | 380  POKE 34,22: HOME : TEXT : VTAB 23:A$ = "EN
   |     TER DATE OF TRANSACTION": GOSUB 3110
67 | 390 VP = 10:HP = 30:LN = 8: FOR X = 1 TO  LEN (
   |     DT$):LN$(X) =  MID$ (DT$,X,1): NEXT X:MP =
   |     LEN (DT$) + 1: GOSUB 3330:DT$ = IN$
A9 | 400  IF DT$ = "" THEN  PRINT  CHR$ (7): GOTO 39
   |     0
55 | 410  FOR Q = 1 TO  LEN (DT$): IF  MID$ (DT$,Q,1
   |     ) = "/" THEN NS = NS + 1
66 | 420  NEXT Q
5B | 430  IF NS <  > 2 THEN  PRINT  CHR$ (7);:NS = 0
   |     : GOTO 390
01 | 440 NS = 0
2F | 450  IF QU = 1 AND DN = 1 THEN 840
5B | 460  POKE 34,22: HOME : TEXT : VTAB 23:A$ = "EN
   |     TER AMOUNT OF TRANSACTION": GOSUB 3110:VP =
   |      11:HP = 20:LN = 8: FOR X = 1 TO  LEN (AM$)
   |     :LN$(X) =  MID$ (AM$,X,1): NEXT X:MP =  LEN
   |      (DT$) + 1: GOSUB 3330
2F | 470  IF IN$ = "0" THEN 510
10 | 480  IF  VAL (IN$) = 0 THEN  PRINT  CHR$ (7):
   |     GOTO 460
0F | 490 AM =  VAL (IN$):AM =  INT (AM * 100 + .5) /
   |      100:AM$ =  STR$ (AM): VTAB 11: HTAB 20:
   |     PRINT AM$;: IF  LEN (AM$) <  > 8 THEN  FOR
   |      X = 1 TO 8 -  LEN (AM$): PRINT  CHR$ (95);
   |     : NEXT X
7E | 500  IF QU = 1 AND DN = 1 THEN 840
87 | 510  POKE 34,22: HOME : TEXT : VTAB 23:A$ = "EN
   |     TER ANY IMPORTANT COMMENTS": GOSUB 3110
6D | 520 VP = 20:HP = 15:LN = 20:FL = 1: FOR X = 1 T
   |     O  LEN (CO$):LN$(X) =  MID$ (CO$,X,1): NEXT
   |      X:MP =  LEN (CO$) + 1: GOSUB 3330:CO$ = IN
   |     $:FL = 0
FB | 530  IF QU = 1 AND DN = 1 THEN 840
B8 | 540 DN = 1: GOTO 380
84 | 550 TY = 1
11 | 560  POKE 34,22: HOME : TEXT : VTAB 23:A$ = "EN
   |     TER DATE OF TRANSACTION": GOSUB 3110
77 | 570 VP = 10:HP = 30:LN = 8: FOR X = 1 TO  LEN (
   |     DT$):LN$(X) =  MID$ (DT$,X,1): NEXT X:MP =
   |     LEN (DT$) + 1: GOSUB 3330:DT$ = IN$
70 | 580  FOR Q = 1 TO  LEN (DT$): IF  MID$ (DT$,Q,1
   |     ) = "/" THEN NS = NS + 1
48 | 590  NEXT Q
3B | 600  IF NS <  > 2 THEN  PRINT  CHR$ (7);:NS = 0
   |     : GOTO 570
EB | 610 NS = 0
AB | 620  IF DT$ = "" THEN  PRINT  CHR$ (7): GOTO 57
   |     0
```

LISTING 1: APPLE.ODOMETER *continued*

```
50 | 630  IF QU = 1 AND DN = 1 THEN 840
5F | 640  POKE 34,22: HOME : TEXT : VTAB 23:A$ = "EN
     TER AMOUNT OF TRANSACTION": GOSUB 3110
89 | 650 VP = 11:HP = 20:LN = 8: FOR X = 1 TO  LEN (
     AM$):LN$(X) =  MID$ (AM$,X,1): NEXT X:MP =
     LEN (AM$) + 1: GOSUB 3330
3B | 660  IF IN$ = "0" THEN 690
E5 | 670  IF  VAL (IN$) > .001 THEN 690
87 | 680  PRINT  CHR$ (7): GOTO 650
23 | 690 AM =  VAL (IN$):AM =  INT (AM * 100 + .5) /
      100:AM$ =  STR$ (AM): HTAB 20: VTAB 11:
     PRINT AM$;: IF  LEN (AM$) <  > 8 THEN  FOR
      X = 1 TO 8 -  LEN (AM$): PRINT  CHR$ (95);
     : NEXT X
F8 | 700  IF QU = 1 AND DN = 1 THEN 840
F8 | 710  POKE 34,22: HOME : TEXT : VTAB 23:A$ = "EN
     TER MILES ON TRIP ODOMETER": GOSUB 3110:VP
     = 15:HP = 22:LN = 6: FOR X = 1 TO  LEN (MI
     $):LN$(X) =  MID$ (MI$,X,1): NEXT X:MP =
     LEN (MI$) + 1: GOSUB 3330:MI$ = IN$
60 | 720  IF MI$ = "" OR  VAL (MI$) = 0 THEN  POKE 3
     4,22: HOME : VTAB 23:A$ = "INCORRECT ENTRY!
     !" +  CHR$ (7) +  CHR$ (7): GOSUB 3110: FOR
      X = 1 TO 1000: NEXT X: GOTO 710
27 | 730 MI =  VAL (MI$):MI =  INT (MI * 10 + .5) /
     10:MI$ =  STR$ (MI): VTAB 15: HTAB 22: PRIN
     T MI$;: IF  LEN (MI$) <  > 6 THEN  FOR X =
     1 TO 6 -  LEN (MI$): PRINT  CHR$ (95);: NEX
     T X
62 | 740  IF QU = 1 AND DN = 1 THEN 840
12 | 750  POKE 34,22: HOME : TEXT : VTAB 23:A$ = "EN
     TERS GALLONS TAKEN AT FILL-UP": GOSUB 3110:
     HP = 17:VP = 16:LN = 5: FOR X = 1 TO  LEN (
     GL$):LN$(X) =  MID$ (GL$,X,1): NEXT X:MP =
     LEN (GL$) + 1: GOSUB 3330:GL$ = IN$
55 | 760  IF GL$ = "" OR  VAL (GL$) = 0 THEN  POKE 3
     4,22: HOME : VTAB 23:A$ = "INCORRECT ENTRY!
     !" +  CHR$ (7) +  CHR$ (7): GOSUB 3110: FOR
      X = 1 TO 1000: NEXT X: GOTO 750
99 | 770 GL =  VAL (GL$):GL =  INT (GL * 10 + .5) /
     10:GL$ =  STR$ (GL): VTAB 16: HTAB 17: PRIN
     T GL$;: IF  LEN (GL$) <  > 5 THEN  FOR X =
     1 TO 5 -  LEN (GL$): PRINT  CHR$ (95);: NEX
     T X
84 | 780  IF QU = 1 AND DN = 1 THEN 840
A9 | 790 MP = MI / GL:MP =  INT (MP * 100 + .5) / 10
     0:MP$ =  STR$ (MP): VTAB 16: HTAB 33: PRINT
      "       "; VTAB 16: HTAB 33: PRINT  LEFT$ (
     MP$,6);" "
AD | 800  POKE 34,22: HOME : TEXT : VTAB 23:A$ = "EN
     TER ANY IMPORTANT COMMENTS": GOSUB 3110
3B | 810 FL = 1:VP = 20:HP = 15:LN = 20: FOR X = 1 T
     O  LEN (CO$):LN$(X) =  MID$ (CO$,X,1): NEXT
      X:MP =  LEN (CO$) + 1: GOSUB 3330:CO$ = IN
     $:FL = 0
BB | 820  IF QU = 1 AND DN = 1 THEN 840
9C | 830 DN = 1: GOTO 560
B6 | 840  PRINT : POKE 34,23: HOME :QU = 0: PRINT D$
     ;"OPEN CAR.";NC$;",L55": PRINT D$;"READ CAR
     .";NC$;",R0": INPUT A$: INPUT R$: PRINT D$;
     "WRITE CAR.";NC$;",R0": PRINT A$: PRINT  VA
     L (R$) + 1: PRINT D$;"WRITE CAR.";NC$;",R";
     VAL (R$) + 1
BA | 850  PRINT TY: PRINT DT$: PRINT AM$: PRINT MI$:
     PRINT GL$: PRINT CO$: PRINT D$;"CLOSE CAR.
     ";NC$
F4 | 860 QU = 0:TY = 0:DN = 0:DT$ = "":AM$ = "":MI$
     = "":MP$ = "":GL$ = "":CO$ = "": TEXT :
     GOTO 110: TEXT : PRINT
96 | 870  IF  PEEK (222) = 6 THEN  PRINT D$"OPEN CAR
     .NAMES": PRINT D$"WRITE CAR.NAMES": PRINT 0
     : PRINT D$"CLOSE CAR.NAMES": GOTO 110
A0 | 880  GOTO 3480
4F | 890  ONERR  GOTO 2200
57 | 900  POKE 34,23: HOME : PRINT D$;"VERIFY CAR.CO
     NFIG"
86 | 910  PRINT D$;"OPEN CAR.CONFIG": PRINT D$;"READ
      CAR.CONFIG": INPUT PS,EC: PRINT D$;"CLOSE
     CAR.CONFIG": TEXT :AC = 1
4D | 920  IF NC$ = "" THEN RT = 1: GOSUB 2960
30 | 930  PRINT D$;"OPEN CAR.";NC$;",L55": PRINT D$;
     "READ CAR.";NC$;",R0": INPUT A$,R$: PRINT D
     $;"CLOSE CAR.";NC$:R =  VAL (R$): IF R = 0
     THEN  HOME : VTAB 11:A$ = "NO DATA FOR CAR
      SELECTED": GOSUB 3110: GOSUB 3510:NC$ = ""
     : GOTO 120
79 | 940 B$ = "REPORTS": GOSUB 3280:CH$(1) = "COST &
      MILEAGE REPORT":CH$(2) = "MILEAGE REPORT":
     CH$(3) = "COST REPORT":CH$(4) = "RETURN TO
     MAIN MENU":NC = 4: GOSUB 3150
6B | 950 XM = 0:TG = 0:TM = 0:TC = 0:CP = 0:PM = 0:A
     P = 0:MP = 0
4A | 960  ON C GOTO 970,1780,1980,110
9B | 970  IF EC = 0 AND PS = 0 THEN  HOME : VTAB 11:
     A$ = "EIGHTY COLUMN CARD OR PRINTER REQUIRE
     D": GOSUB 3110: GOSUB 3510: GOTO 940
C6 | 980 B$ = "MILEAGE & COST REPORT": GOSUB 3280
69 | 990  IF PS = 0 THEN MO = 1: GOTO 1050
33 | 1000  IF EC = 0 THEN MO = 2: GOTO 1050
03 | 1010  GOSUB 1380
62 | 1020  IF A$ = "S" OR A$ = "s" THEN MO = 1: GOTO
      1050
4C | 1030  IF A$ <  > "P" AND A$ <  > "p" THEN 1010
54 | 1040 MO = 2
A4 | 1050  VTAB 13: PRINT "ENTER YEAR (A FOR ALL) --
     > ";:NU = 2: GOSUB 3310:HP = 28:VP = 13:LN
     = 2: GOSUB 3330:PY$ = IN$: IF PY$ = "A" OR
      PY$ = "a" THEN 1070
93 | 1060  IF  VAL (PY$) = 0 AND PY$ <  > "0" AND PY
     $ <  > "00" THEN 1050
54 | 1070  IF MO = 1 THEN  PRINT D$;"PR#";EC: PRINT
     CHR$ (12)
91 | 1080  IF MO = 2 THEN  PRINT D$;"PR#";PS: PRINT
     CHR$ (9);"80N"
0F | 1090 A$ = "MILEAGE & COST REPORT FOR " + NC$:
     PRINT  SPC( (74 -  LEN (A$)) / 2);A$: PRIN
     T
AD | 1100  PRINT "
                  COST PER": PRINT "  DATE    MI
LE
     AGE  GALLONS   MPG     COST      MILE
        COMMENTS"
FA | 1110  PRINT "-------- -------  -------  -----
      -------- -------- -------------------"
F2 | 1120 CN = 0
55 | 1130  PRINT D$;"OPEN CAR.";NC$;",L55": PRINT D$
     ;"READ CAR.";NC$;",R0": INPUT SM$: INPUT R$
     :R =  VAL (R$)
00 | 1140  FOR RN = 1 TO R
90 | 1150  PRINT D$;"READ CAR.";NC$;",R";RN
BA | 1160 CO$ = "": INPUT TY: INPUT DT$: INPUT AM$:
     INPUT MI$: INPUT GL$
94 | 1170  FOR X = 1 TO 25: GET A$: IF A$ =  CHR$ (1
     3) THEN 1190
C0 | 1180 CO$ = CO$ + A$: NEXT X
80 | 1190  PRINT : ON TY GOTO 1200,1350
B7 | 1200  GOSUB 1390: IF PY$ = "A" THEN 1220
BC | 1210  IF YR$ <  > RIGHT$ (PY$,2) THEN 1260
BC | 1220  GOSUB 1470: GOSUB 1520: GOSUB 1570: GOSUB
      1640: GOSUB 1700
47 | 1230 TM = TM +  VAL (MI$):TG = TG +  VAL (GL$):
     PM = PM +  VAL (MP$):AP = AP +  VAL (CP$)
67 | 1240  PRINT DT$;"  ";MI$;"  ";GL$;"  ";MP$;"  "
     ;AM$;"  ";CP$;" ";CO$:NP = 1
4F | 1250 TC = TC +  VAL (AM$)
1A | 1260  IF TY = 1 THEN XM = XM +  VAL (MI$)
20 | 1270  NEXT RN
FF | 1280  PRINT D$;"CLOSE CAR.";NC$
D4 | 1290  FOR X = 1 TO 74: PRINT "-";: NEXT X: PRIN
     T
F3 | 1300  IF NP = 0 THEN 1330
38 | 1310 MI$ =  STR$ (TM): GOSUB 1470:TM$ = MI$:GL$
     =  STR$ (TG): GOSUB 1520:GA$ = GL$:MI$ = T
     M$:GL$ = GA$: GOSUB 1570:AM$ =  STR$ (TC):
     GOSUB 1640:AS$ = AM$:AM$ = AS$:MI$ = TM$:
     GOSUB 1700
8B | 1320  PRINT "TOTALS     ";TM$;"  ";GA$;"
      ";AS$:MI = XM +  VAL (SM$):MI$ =  STR$ (MI
     ): GOSUB 1470: PRINT "AVERAGES
           ";MP$;"           ";CP$: PRINT :
     PRINT "CURRENT ODOMETER READING:  ";MI$
A7 | 1330 NP = 0: IF MO = 2 THEN  PRINT D$;"PR#0":
     GOTO 940
B7 | 1340  PRINT : PRINT : PRINT  SPC( 30);"HIT ANY
     KEY FOR MENU": WAIT  - 16384,128: POKE  - 1
```

```
    6368,0: PRINT  CHR$ (21): GOTO 940
42  1350  GOSUB 1390:MI$ = "        ":GL$ = "
    ":MP$ = "      ": IF PY$ = "A" THEN 1370
A9  1360  IF YR$ <  > RIGHT$ (PY$,2) THEN 1260
0F  1370  GOSUB 1640:CP$ = "        ": GOTO 1240
A6  1380  VTAB 11: PRINT "PRINT TO SCREEN OR PRINTE
    R (S/P) --> *"; CHR$ (8);: GET A$: PRINT A$
    : RETURN
BA  1390  FOR Q = 1 TO  LEN (DT$): IF  MID$ (DT$,Q,
    1) = "/" THEN MN$ =  LEFT$ (DT$,Q - 1): GOT
    O 1410
E2  1400  NEXT Q
D6  1410 T = Q + 1:X = 0: FOR X = T TO  LEN (DT$):
    IF  MID$ (DT$,X,1) = "/" THEN DY$ =  MID$
    (DT$,T,X - T):YR$ =  RIGHT$ (DT$, LEN (DT$)
    - X): GOTO 1430
28  1420  NEXT X
F1  1430  IF  LEN (MN$) = 1 THEN MN$ = "0" + MN$
69  1440  IF  LEN (DY$) = 1 THEN DY$ = "0" + DY$
C4  1450  IF  LEN (YR$) = 1 THEN YR$ = "0" + YR$
5A  1460 DT$ = MN$ + "/" + DY$ + "/" + YR$:DT$ =
    LEFT$ (DT$,9): RETURN
1A  1470  FOR X = 1 TO  LEN (MI$): IF  MID$ (MI$,X,
    1) = "." THEN 1490
84  1480  NEXT X:MI$ = MI$ + ".0"
3B  1490  IF  LEN (MI$) = 7 THEN 1510
86  1500  FOR X = 1 TO 7 -  LEN (MI$):MI$ = " " + M
    I$: NEXT X
EE  1510 MI$ =  LEFT$ (MI$,7): RETURN
3E  1520  FOR X = 1 TO  LEN (GL$): IF  MID$ (GL$,X,
    1) = "." THEN 1540
73  1530  NEXT X:GL$ = GL$ + ".0"
A7  1540  IF  LEN (GL$) = 7 THEN 1560
81  1550  FOR X = 1 TO 7 -  LEN (GL$):GL$ = " " + G
    L$: NEXT X
BB  1560 GL$ =  LEFT$ (GL$,7): RETURN
FC  1570 MP =  VAL (MI$) /  VAL (GL$):MP =  INT (MP
    * 100 + .5) / 100:MP$ =  STR$ (MP)
4D  1580  FOR X = 1 TO  LEN (MP$): IF  MID$ (MP$,X,
    1) = "." THEN 1600
36  1590  NEXT X:MP$ = MP$ + ".00": GOTO 1610
69  1600  IF X =  LEN (MP$) - 1 THEN MP$ = MP$ + "0
    "
7A  1610  IF  LEN (MP$) = 5 THEN 1630
84  1620  FOR X = 1 TO 5 -  LEN (MP$):MP$ = " " + M
    P$: NEXT X
9E  1630 MP$ =  LEFT$ (MP$,5): RETURN
82  1640  FOR X = 1 TO  LEN (AM$): IF  MID$ (AM$,X,
    1) = "." THEN 1660
1B  1650  NEXT X:AM$ = AM$ + ".00": GOTO 1670
C2  1660  IF X =  LEN (AM$) - 1 THEN AM$ = AM$ + "0
    "
E6  1670  IF  LEN (AM$) = 8 THEN 1690
B2  1680  FOR X = 1 TO 8 -  LEN (AM$):AM$ = " " + A
    M$: NEXT X
F9  1690 AM$ =  LEFT$ (AM$,8): RETURN
89  1700 CP =  VAL (AM$) /  VAL (MI$):CP =  INT (CP
    * 1000 + .5) / 1000:CP$ =  STR$ (CP)
F0  1710  FOR X = 1 TO  LEN (CP$): IF  MID$ (CP$,X,
    1) = "." THEN 1730
D0  1720  NEXT X:CP$ = CP$ + ".000": GOTO 1750
80  1730  IF X =  LEN (CP$) - 2 THEN CP$ = CP$ + "0
    "
2C  1740  IF X =  LEN (CP$) - 1 THEN CP$ = CP$ + "0
    0"
50  1750  IF  LEN (CP$) = 8 THEN 1770
A0  1760  FOR X = 1 TO 8 -  LEN (CP$):CP$ = " " + C
    P$: NEXT X
49  1770 CP$ =  LEFT$ (CP$,8): RETURN
66  1780 B$ = "MILEAGE REPORT": GOSUB 3280: VTAB 9:
    IF PS = 0 THEN MO = 1: GOTO 1830
1D  1790  GOSUB 1380
92  1800  IF A$ = "S" OR A$ = "s" THEN MO = 1: GOTO
     1830
C8  1810  IF A$ <  > "P" AND A$ <  > "p" THEN 1790
BB  1820 MO = 2
B5  1830  IF MO = 2 THEN  PRINT D$;"PR#";PS
C0  1840  HOME :A$ = "MILEAGE REPORT FOR " + NC$:
    GOSUB 3110: PRINT : PRINT "     DATE     MI
    LEAGE  GALLONS    MPG": PRINT "    --------
    -------  -------  -----"
0D  1850  IF MO = 1 THEN  POKE 34,4
94  1860  PRINT D$;"OPEN CAR.";NC$;",L55": PRINT D$
    ;"READ CAR.";NC$;",R0": INPUT SM$,R:SM =
    VAL (SM$)
41  1870  FOR RN = 1 TO R
EE  1880  PRINT D$;"READ CAR.";NC$;",R";RN: INPUT T
    Y,DT$,X$,MI$,GL$
FA  1890  IF TY = 2 THEN 1930
FE  1900  GOSUB 1390: GOSUB 1470: GOSUB 1520: GOSUB
     1570
88  1910  PRINT "    ";DT$;"  ";MI$;"  ";GL$;"  ";MP
    $
F6  1920 TM = TM +  VAL (MI$):TG = TG +  VAL (GL$)
E8  1930  NEXT RN: PRINT D$;"CLOSE CAR.";NC$
C4  1940 MI$ =  STR$ (TM): GOSUB 1470:GL$ =  STR$ (
    TG): GOSUB 1520: GOSUB 1570
D3  1950  PRINT "    ";: FOR X = 1 TO 33: PRINT "-";
    : NEXT X: PRINT : PRINT "   TOTALS    ";MI$
    ;"   ";GL$: PRINT "   AVERAGE
          ";MP$
F4  1960  IF MO = 2 THEN  PRINT D$;"PR#0": GOTO 940
    0
DE  1970  PRINT : PRINT :A$ = "HIT ANY KEY": GOSUB
    3110: WAIT  - 16384,128: POKE  - 16368,0:
    GOTO 940
5B  1980 B$ = "COST REPORT": GOSUB 3280
8E  1990  IF PS = 0 THEN MO = 1: GOTO 2030
B0  2000  GOSUB 1380: IF A$ = "P" OR A$ = "p" THEN
    MO = 2: GOTO 2030
50  2010  IF A$ <  > "S" AND A$ <  > "s" THEN 2000
45  2020 MO = 1
07  2030  IF MO = 2 THEN  PRINT D$;"PR#";PS
08  2040  HOME :A$ = "COST REPORT FOR " + NC$: GOSU
    B 3110
3A  2050  PRINT : PRINT "  DATE     AMOUNT        C
    OMMENTS": PRINT "--------  -------- -------
    ------------"
2B  2060  IF PM = 1 THEN  POKE 34,4
99  2070  PRINT D$;"OPEN CAR.";NC$;",L55": PRINT D$
    ;"READ CAR.";NC$;",R0": INPUT X,R
92  2080  FOR RN = 1 TO R
25  2090  PRINT D$;"READ CAR.";NC$;",R";RN
EC  2100  INPUT X,DT$,AM$,X$,X$:CO$ = "": FOR X = 1
    TO 20: GET A$: IF A$ =  CHR$ (13) THEN 212
    0
9A  2110 CO$ = CO$ + A$: NEXT X
91  2120  PRINT : GOSUB 1390: GOSUB 1640
61  2130  PRINT DT$;"  ";AM$;"  ";CO$
E8  2140 TC = TC +  VAL (AM$)
4C  2150  NEXT RN
32  2160  PRINT D$;"CLOSE CAR.";NC$
A9  2170  FOR X = 1 TO 39: PRINT "-";: NEXT X: PRIN
    T
C3  2180 AM$ =  STR$ (TC): GOSUB 1640: PRINT "TOTAL
          ";AM$
2A  2190  GOTO 1960
33  2200  IF  PEEK (222) = 6 THEN  HOME : VTAB 11:A
    $ = "SYSTEM NOT CONFIGURED": GOSUB 3110:
    WAIT  - 16384,128: POKE  - 16368,0: GOTO 1
    10
75  2210  GOTO 3480
2E  2220  HOME : VTAB 3:B$ = "CONFIGURE/START/DELET
    E": GOSUB 3110: GOSUB 3280
9B  2230 CH$(1) = "CONFIGURE/RE-CONFIGURE SYSTEM":C
    H$(2) = "START A NEW CAR":CH$(3) = "DELETE
    A CAR":CH$(4) = "RETURN TO MAIN MENU":NC =
    4: GOSUB 3150
F6  2240  ON C GOTO 2250,2420,2790,110
BD  2250  ONERR  GOTO 2400
14  2260  PRINT D$;"VERIFY CAR.CONFIG": GOSUB 3050
C9  2270 B$ = "RE-CONFIGURE SYSTEM"
20  2280  GOSUB 3280
56  2290  VTAB 9: PRINT "PRINTER IN SYSTEM? : ";PS$
    : VTAB 11: PRINT "EIGHTY COLUMN IN SYSTEM?
    : ";EC$
BA  2300  VTAB 9: HTAB 22: GET PS$: PRINT PS$: IF P
    S$ <  > "Y" AND PS$ <  > "y" AND PS$ <  > "
    n" AND PS$ <  > "N" AND PS$ <  >  CHR$ (13)
    THEN  PRINT  CHR$ (7): GOTO 2300
58  2310  IF PS$ = "N" OR PS$ = "n" THEN PS = 0
86  2320  IF PS$ = "Y" OR PS$ = "y" THEN PS = 1
AF  2330  VTAB 11: HTAB 28: GET EC$: PRINT EC$: IF
    EC$ <  > "Y" AND EC$ <  > "N" AND EC$ <  >
    "y" AND EC$ <  > "n" AND EC$ <  >  CHR$ (13
    ) THEN  PRINT  CHR$ (7): GOTO 2330
7D  2340  IF EC$ = "Y" OR EC$ = "y" THEN EC = 3
```

LISTING 1: APPLE.ODOMETER *continued*

```
32 2350  IF EC$ = "N" OR EC$ = "n" THEN EC = 0
64 2360  VTAB 20: GOSUB 3470: IF A$ = "Y" OR A$ =
     "y" THEN 2390
BF 2370  IF A$ <  > "N" AND A$ <  > "n" THEN 2360
B8 2380  GOTO 2290
91 2390  PRINT D$;"OPEN CAR.CONFIG": PRINT D$;"WRI
     TE CAR.CONFIG": PRINT PS: PRINT EC: PRINT D
     $;"CLOSE CAR.CONFIG":AC = 1: GOTO 2220
AF 2400  IF  PEEK (222) = 6 THEN B$ = "CONFIGURE S
     YSTEM": GOTO 2280
23 2410  GOTO 3480
DB 2420  ONERR  GOTO 2460
5B 2430  PRINT D$;"OPEN CAR.NAMES": PRINT D$;"READ
      CAR.NAMES": INPUT NC: PRINT D$;"CLOSE CAR.
     NAMES": IF NC = 0 THEN ND = 1
AB 2440  IF NC > 0 THEN  PRINT D$;"OPEN CAR.NAMES"
     : PRINT D$;"READ CAR.NAMES": INPUT NC: FOR
     X = 1 TO NC: INPUT CN$(X): NEXT X: PRINT D$
     ;"CLOSE CAR.NAMES"
FD 2450  IF NC = 6 THEN  HOME : VTAB 11: HTAB 2:
     PRINT "I CAN'T HOLD ANY MORE CAR NAMES. SO
     RRY.": GOSUB 3510: GOTO 2220
E8 2460 B$ = "START A NEW CAR": GOSUB 3280
26 2470 CR$ = "": VTAB 9:A$ = "ENTER CAR NAME":LN
     = 11: GOSUB 3320
32 2480 CR$ = IN$: IF CR$ = "" THEN  VTAB 11: PRIN
     T  CHR$ (7): GOTO 2470
21 2490  ONERR  GOTO 3520
62 2500  PRINT D$"VERIFY CAR."CR$
2F 2510  VTAB 11: GOSUB 3470
AE 2520  IF A$ = "Y" OR A$ = "y" THEN 2550
F2 2530  IF A$ <  > "N" AND A$ <  > "n" THEN 2510
0C 2540  GOTO 2470
61 2550  ONERR  GOTO 2770
16 2560  FOR C = 1 TO NC: IF CN$(C) = CR$ THEN 258
     0
01 2570  NEXT C: GOTO 2620
66 2580  VTAB 13: PRINT "THAT CAR ALREADY EXISTS.
     DO YOU WANT": PRINT "TO REPLACE IT (Y/N) --
     > *"; CHR$ (8);: GET A$: PRINT A$
27 2590  IF A$ = "Y" OR A$ = "y" THEN DC$ = CR$:RT
     = 1: GOSUB 2890: POKE 34,10: HOME : TEXT :
     GOTO 2620
41 2600  IF A$ <  > "N" AND A$ <  > "n" THEN 2580
0B 2610  POKE 34,10: HOME : TEXT :IN$ = "":CR$ = "
     ": GOTO 2470
BA 2620 ML$ = "": VTAB 11:A$ = "ENTER MILEAGE TO D
     ATE":LN = 10: GOSUB 3320:ML$ = IN$: IF ML$
     = "" THEN  PRINT  CHR$ (7): GOTO 2620
E2 2630  VTAB 13: GOSUB 3470
0B 2640  IF A$ = "Y" OR A$ = "y" THEN 2670
5D 2650  IF A$ <  > "N" AND A$ <  > "n" THEN 2630
2F 2660  GOTO 2620
7B 2670 ML =  VAL (ML$):ML =  INT (ML * 100 + .5)
     / 100:ML$ =  STR$ (ML)
1E 2680  PRINT D$"OPEN CAR."CR$",L55": PRINT D$"WR
     ITE CAR."CR$",R0":: PRINT ML$: PRINT 0:
     PRINT D$"CLOSE CAR."CR$
2E 2690  ONERR  GOTO 2750
E2 2700  PRINT D$"OPEN CAR.NAMES": PRINT D$"READ C
     AR.NAMES": INPUT NC: PRINT D$"CLOSE CAR.NAM
     ES": ON NC = 0 GOTO 2710: PRINT D$"OPEN CAR
     .NAMES": PRINT D$"READ CAR.NAMES": INPUT NC
     : FOR X = 1 TO NC: INPUT NC$(X): NEXT X:
     PRINT D$"CLOSE CAR.NAMES"
0C 2710  PRINT D$;"OPEN CAR.NAMES": PRINT D$;"WRIT
     E CAR.NAMES": IF ND = 1 THEN ND = 0: PRINT
     NC + 1: PRINT CR$: GOTO 2730
E7 2720  PRINT NC + 1: FOR X = 1 TO NC: PRINT NC$(
     X): NEXT X: PRINT CR$
19 2730  PRINT D$;"CLOSE CAR.NAMES"
7A 2740 NC$ = CR$: GOTO 2220
DA 2750  PRINT D$"CLOSE CAR.NAMES": IF  PEEK (222)
     = 5 THEN NC = 1:ND = 1: GOTO 2710
71 2760  GOTO 3480
0A 2770  IF  PEEK (222) = 6 THEN 2620
12 2780  GOTO 3480
06 2790  ONERR  GOTO 2940
BA 2800 B$ = "DELETE A CAR": GOSUB 3280: PRINT D$"
     VERIFY CAR.NAMES"
C5 2810  PRINT D$;"OPEN CAR.NAMES": PRINT D$;"READ
      CAR.NAMES": INPUT NC: IF NC = 0 THEN  PRIN
     T D$"CLOSE CAR.NAMES": POKE 222,6: GOTO 294
     0
65 2820  FOR X = 1 TO NC: INPUT CN$(X): NEXT X:
     PRINT D$;"CLOSE CAR.NAMES"
05 2830  FOR X = 1 TO NC:CH$(X) = CN$(X): NEXT X:
     GOSUB 3150
EC 2840 DC$ = CN$(C)
6B 2850  POKE 34,8: HOME : TEXT : VTAB 9: FLASH :
     PRINT "DELETE ";DC$: NORMAL
C0 2860  VTAB 11: PRINT "ARE YOU SURE (Y/N) --> *"
     ; CHR$ (8);: GET A$: PRINT A$
77 2870  IF A$ = "N" OR A$ = "n" THEN 2220
3E 2880  IF A$ <  > "Y" AND A$ <  > "y" THEN 2860
4A 2890  PRINT D$;"DELETE CAR.";DC$
DF 2900  FOR X = C + 1 TO NC:CN$(X - 1) = CN$(X):
     NEXT X:NC = NC - 1
1A 2910  IF NC = 0 THEN  PRINT D$"OPEN CAR.NAMES":
     PRINT D$"WRITE CAR.NAMES": PRINT 0: PRINT
     D$"CLOSE CAR.NAMES": GOTO 2220
97 2920  PRINT D$;"OPEN CAR.NAMES": PRINT D$;"WRIT
     E CAR.NAMES": PRINT NC: FOR X = 1 TO NC:
     PRINT CN$(X): NEXT X: PRINT D$;"CLOSE CAR.
     NAMES":NC$ = "": IF RT = 1 THEN RT = 0:
     RETURN
BD 2930  GOTO 2220
80 2940  IF  PEEK (222) = 6 THEN  HOME : VTAB 11:A
     $ = "NO CARS ON FILE": GOSUB 3110: GOSUB 35
     10: GOTO 2220
28 2950  GOTO 3480
3C 2960  ONERR  GOTO 3030
BB 2970  PRINT D$;"OPEN CAR.NAMES": PRINT D$;"READ
      CAR.NAMES": INPUT NC: IF NC = 0 THEN  PRIN
     T D$"CLOSE CAR.NAMES": GOTO 3030
D0 2980  FOR X = 1 TO NC: INPUT NC$(X): NEXT X:
     PRINT D$;"CLOSE CAR.NAMES"
74 2990  IF NC = 1 THEN C = 1: GOTO 3010
1C 3000 B$ = "SELECT A CAR": GOSUB 3280: FOR X = 1
     TO NC:CH$(X) = NC$(X): NEXT X: GOSUB 3150
58 3010 NC$ = NC$(C): IF RT = 1 THEN RT = 0: RETUR
     N
82 3020  GOTO 110
B5 3030  IF  PEEK (222) = 6 OR NC = 0 THEN  TEXT :
     HOME : VTAB 11:A$ = "NO CARS ON FILE": POK
     E 49168,0: GOSUB 3110: GOSUB 3510: GOTO 120

78 3040  GOTO 3480
83 3050  POKE 34,23: PRINT D$;"OPEN CAR.CONFIG":
     PRINT D$;"READ CAR.CONFIG":
B4 3060  INPUT PS: INPUT EC: INPUT E0$: PRINT D$;"
     CLOSE CAR.CONFIG": TEXT :EC$ = "N":PS$ = "N
     "
C8 3070  IF PS = 1 THEN PS$ = "Y"
06 3080  IF EC = 3 THEN EC$ = "Y"
B1 3090  RETURN
DA 3100  HOME : PRINT "GOODBYE...": GOTO 3500
F1 3110  NORMAL : PRINT  SPC( (40 -  LEN (A$)) / 2
     );A$: IF DN = 1 THEN  VTAB 24: HTAB 2:
     INVERSE : PRINT "PRESS <CTRL-S> TO SAVE OR
      ESC TO EXIT";: NORMAL
F7 3120  RETURN
7A 3130  HTAB ((40 -  LEN (A$)) / 2 + 1): INVERSE
     : PRINT A$: RETURN
4E 3140  NORMAL : HTAB ((40 -  LEN (A$)) / 2 + 1):
     PRINT A$: RETURN
0B 3150  POKE  - 16368,0:Z =  FRE (0): PRINT :VT =
      13 - NC:: FOR DI = 1 TO NC: VTAB (VT + DI
     * 2):A$ = CH$(DI): GOSUB 3110:SP(DI) = VT
     + DI * 2: NEXT DI:C = 1
7A 3160  POKE 34,21: HOME : TEXT : VTAB 22: HTAB 8
     : INVERSE : PRINT "<--";: NORMAL : PRINT "
      ";: INVERSE : PRINT "-->";: NORMAL : PRINT
     "  <";: INVERSE : PRINT "RETURN";: NORMAL
     : PRINT ">  <";: INVERSE : PRINT "ESC";:
     NORMAL : PRINT ">"
20 3170 A$ = CH$(C): VTAB (SP(C)): GOSUB 3130
75 3180  WAIT  - 16384,128:A =  PEEK ( - 16384) -
     128: POKE  - 16368,0
ED 3190  IF A = 27 THEN 120
C5 3200  IF A = 13 THEN  NORMAL : RETURN
2E 3210  IF A = 21 OR A = 10 THEN OC = C:C = C + 1
     : GOTO 3240
D2 3220  IF A = 8 OR A = 11 THEN OC = C:C = C - 1:
     GOTO 3240
03 3230  GOTO 3180
67 3240  VTAB (SP(OC)):A$ = CH$(OC): GOSUB 3140
E0 3250  IF C = NC + 1 THEN C = 1
```

```
4F | 3260  IF C = 0 THEN C = NC
9E | 3270  GOTO 3170
73 | 3280  TEXT : HOME : VTAB 3:A$ = "THE APPLE ODOM
       ETER": GOSUB 3110: VTAB 4:A$ = B$: GOSUB 31
       10
BC | 3290  FOR X = 1 TO 6: NORMAL : VTAB X: HTAB 4:
       INVERSE : PRINT " ";: NORMAL : HTAB 37:
       INVERSE : PRINT " ";: NEXT X: NORMAL
DB | 3300  VTAB 1: HTAB 4: INVERSE : PRINT "
                                  ": NORMAL : VTAB 6
       : HTAB 4: INVERSE : PRINT "
                              ": NORMAL : RETURN : REM
       33 AND 33 SPACES
16 | 3310  FOR X = 1 TO NU: PRINT  CHR$ (95);: NEXT
       X: RETURN
D0 | 3320  PRINT A$;"  ->";::HP =  PEEK (36) + 1:VP
       =  PEEK (37) + 1: PRINT  SPC( LN);"<-"
8B | 3330 IN$ = "": HTAB HP: VTAB VP:P = 1
64 | 3340  HTAB HP + P - 1: GET I$: PRINT I$;
7F | 3350  IF I$ =  CHR$ (27) AND DN = 1 THEN 120
60 | 3360  IF I$ =  CHR$ (32) AND FL = 1 THEN 3420
9F | 3370  IF I$ =  CHR$ (32) THEN  PRINT  CHR$ (8);
       : GOTO 3340
4E | 3380  IF I$ =  CHR$ (13) THEN MP = MP - (EL = 0
       ): GOTO 3450
EC | 3390  IF I$ =  CHR$ (8) OR I$ =  CHR$ (127) THE
       N P = P - 1: IF P = 0 THEN P = 1: HTAB HP:
       PRINT  CHR$ (7);
31 | 3400  IF I$ =  CHR$ (8) OR I$ =  CHR$ (127) THE
       N 3340
27 | 3410  IF I$ =  CHR$ (19) THEN QU = 1: GOTO 3450

E4 | 3420  IF  ASC (I$) <  > 95 AND  ASC (I$) > 31
       THEN LN$(P) = I$:P = P + 1: IF P = LN + 1
       THEN  PRINT  CHR$ (7);:P = P - 1:EL = 1:
       HTAB (HP + LN - 1)
D0 | 3430  IF P > MP THEN MP = P
E0 | 3440  GOTO 3340
1B | 3450  FOR T = 1 TO MP:IN$ = IN$ + LN$(T): NEXT
       T:EL = 0
B8 | 3460  FOR Q = 1 TO MP:LN$(Q) = "": NEXT :MP = 0
       : RETURN
E9 | 3470  PRINT "IS THIS CORRECT (Y/N) --> *"; CHR$
       (8);: GET A$: PRINT A$: RETURN
3E | 3480  IF  PEEK (222) = 255 THEN  RESUME
37 | 3490  PRINT : PRINT "ERROR # "; PEEK (222);" IN
       LINE "; PEEK (218) +  PEEK (219) * 256;"."
       : PRINT "PROGRAM TERMINATED"
7D | 3500  END
C0 | 3510  VTAB 23: HTAB 8: PRINT "PRESS RETURN TO C
       ONTINUE";: GET ZZ$: HTAB 1: VTAB 23: PRINT
       "";: CALL  - 958: RETURN
CA | 3520  IF  PEEK (222) = 16 THEN 2470
B2 | 3530  GOTO 2510

TOTAL: 829B

END OF LISTING 1
```


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3. Or Call: 1-800-888-1660 with your credit card.

Many people still use the old DOS because there was so much good software written for it. It is easy to learn, easy to modify, and easy to use from machine language. We acknowledge that our readers our looking for state-of-the-art information and programs. We also know that they seek new methods to use the gigabytes of older DOS 3.3 material.

The two DOS 3.3-related programs in April illustrate our commitment to support the old Apple II users in their quest to take advantage of newer technology, by simplifying the porting of programs from DOS 3.3 to ProDOS (ProDOS Linker), and speeding up existing DOS 3.3 programs on the IIGS (RAM Disk 3.3).

By the way, we certainly share your dream for the future of the Apple II with a 20 Mhz processor! We'd love to see one too.

VERSATILITY II

► This is a letter to tell you how great the Apple II is. I have a IIGS, and I have not found any application I cannot do with the IIGS, AppleWorks, and the TimeOut series from Beagle Bros. I use it in my home, business, and education. Examples include science projects for school, kitchen inventory and lunch count at the school, membership, finance, desktop publishing for a dairy goat club, and of course budgets, cash flows, and taxes.

I would like to encourage you to keep up the Apple II line, and to push it aggressively for all types of applications.

I am a member of Big Red Computer Club and National Appleworks Users Group.

Becky Jo Schnaufer
Keyes, OK

REVIEWING REVIEWS

► I must address a few comments in Neil Shapiro's review of 2088: The Cryllan Mission (April 1990). As you know, my brothers and I have been submitting programs to *Nibble* since 1982. In 1988 we formed Victory Software to write 2088.

The review closes by stating, "But it was obviously a family effort in programming and design that might well have benefited from an outside editor." Neil's remark would imply that family-owned companies are inferior to more corporate counterparts.

I cannot agree with his comments regarding our manual, since we have not received complaints from our customers. Furthermore, I cannot agree with his comments regarding our novel approach to conversation. In fact, our customers have enjoyed it.

Many companies have completely ignored the need for IIGS-specific software. Victory Software, however, has written a true IIGS application and, in the process, created a role-playing game with some unconventional features, such as our conversation.

While many companies are deserting the Apple II market, Victory Software has made a strong commitment to the Apple IIGS. In a few months, we will release two more IIGS-specific products.

Vinay Pai
President
Victory Software
Houston, Texas

"...the single most important business-oriented product for the Apple II since *AppleWorks.*"

APPLE II

BY CHARLES H. GAJEWAY

Masterful database. Are you ready for a sweeping statement? Here goes: I think that *DB Master Professional* (Stone Edge Technologies: $295) is the single most important business-oriented product for the Apple II since the introduction of *AppleWorks*. As the only true relational database program for the Apple IIe, IIc, and IIGS, *DBMP* can give a 128K Apple II the kind of data-handling power and flexibility normally associated with MS-DOS and Macintosh systems running expensive and hard-to-learn software. (A relational database can link, or *relate*, information from several data files.)

I jumped right into the program with my standard test data—a pair of files that tracks a record collection, with information on album titles, artists, music category, song lengths, and composers. This test is complex, and many well-regarded programs—including *AppleWorks*—have failed miserably at it. Even with very little experience, I was able to get the system up and running with *DBMP* in a surprisingly short time.

Report generation is extremely powerful, making it easy to design anything from a mailing label, to a point-of-sale invoice (that automatically updates inventory records, of course), to customized form letters. Whereas most database programs must be combined with a word processor to do complex reports or mail merge, *DBMP* does it all.

The manuals are complete, well illustrated, and generally clear, although they are sometimes overly technical and fragmented. You will need to keep both books handy at all times, especially as you try out some of the more sophisticated features. And while the program is operated with a simple menu system, *DBMP* takes a fair amount of time to learn because of its array of features and options. *DBMP* gives you all the power you need and can even import your current files from *AppleWorks* (except version 3.0) and other programs. ■

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DB Master *Professional*

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Neil Shapiro replies:

My comments about 2088 were, for the most part, positive. But I did call out two faults with the game. The more subjective of these was that the dialogue given to the townspeople seems to be overdone, too long, and certainly not realistic. This is an opinion, but I feel most people who play 2088 will agree.

My complaint with the manual is not so subjective. It lacks complete diagrams of screen displays, a tutorial, charts of opponents' strengths, and a step-by-step explanation of combat.

I did state that "once you get past the manual, if you can treat the townspeople with a sort of half-eared indulgence, I think you'll find 2088 to be the first RPG to take full advantage of the Apple IIGS." I agree that it was a "bold and unconventional approach." I also agree that Victory has created a "true GS application." That's why I recommended that people investigate the game.

THE ERROR TRAP

■ **Another Applesoft Mover** (Vol. 10/No. 8, **Listing 1**: MOVER, p. 57): Two lines were left out. Insert the following two lines between lines 63993 and 63994. You will either have to renumber the program in order to do so, or retype lines 63989 through 63993 and start numbering them at 63985.

```
63993 AL = 16385:AH = 16386:L =
( PEEK (175) + (256 * PEEK (176)))
- 2048: REM  set high and low
byte pointers and length of prgm

63994  POKE AH, PEEK (AH) + 64 -
8:AL =  PEEK (AL) + (256 * PEEK
(AH)):AH = AL + 1: IF(AH - 16386)
< L THEN 63990: REM parse through
prgm and change high byte pointers
```

■ **Hi-Res Color Scout** (Vol. 11/No. 4, **Listing 2**: COLORSCOUT.BIN, p. 75): The commands to zero memory were incorrect and cause the program to break into the system monitor. If you used an assembler use the following command after CALL−151:

```
2112:Ø N 2113>2112.21FEM
```

If you entered **Listing 2** enter the following commands:

```
BLOAD COLORSCOUT.BIN
CALL-151
2108:AD 13 21 85 43 AØ ØØ 4C 2C FE
```

Press Control-C, then enter

```
BSAVE COLORSCOUT.BIN,A$2000,L$78F
```

Tech Support
If you need help with your *Nibble* program, contact the Nibble Technical Support Staff at *Nibble*, 52 Domino Drive, Concord, MA 01742. Please include a self-addressed, stamped envelope. Phone support is available on the Tech Support line from Monday through Friday between 2 and 5 PM EST at (508) 371-1669.

Nibble Hot Line
If you own a 300- or 1200-baud modem, call the Nibble Hot Line to receive the latest errata notices, download a One-Liner, or order a Nibble/MindCraft product. The Hot Line provides up-to-the-minute, 24-hour technical information on *Nibble* programs plus other Apple goodies. Have your Apple call our Apple at (508) 369-8920. Set your communications software at 8 data bits, 1 stop bit, no parity, full duplex. The Hot Line will automatically determine the correct baud rate.

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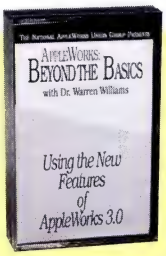
ON THE SCENE *continued from page 15*

TRAINING WHEELS FOR APPLEWORKS



■ Learn how to use AppleWorks on your way to work. Just pop in the new tape from NAUG (the National Apple User's Group), watch the road, and listen. This new 90-minute tape, **How to Use the Features of AppleWorks 3.0**, showcases Dr. Warren Williams describing how to use the more than 50 new features added to the latest version of AppleWorks. The tape costs $9.95 including shipping. *The National Apple User's Group, Box 87453, Canton, MI 48187; (313) 454-1115.*

CIRCLE NUMBER 158

A SPECIAL FIESTA

■ If you love to mix a good time with the love of all Apple computers, get tickets now for the June 15-17 **AppleFiesta '90** in Tempe Arizona, sponsored by the AzApple/Mac User Group. This fourth annual show at the Sheraton Tempe Mission Palms will feature up to 50 vendor displays, seminars, and user group and public forums. The advance reservation ticket price of $8.00 is available through June 1. Apple Computer will be taking four booths, and will show its support by sponsoring a breakfast and a hospitality suite and supplying more computers and equipment. Some of the other Apple II vendors at the show include Beagle Bros, Chinook, Broderbund, Applied Engineering, Ingenuity Inc., Stone Edge Technology, Roger Wagner, and Addison-Wesley. *Apple Fiesta 1990, P.O. Box 34056, Phoenix, AZ 85067; (602) 992-5515.*

CIRCLE NUMBER 159

NOT JUST SINGLE FILE

■ The telecommunications service **America Online** offers Apple II and Macintosh owners a combined 10,000 public domain and shareware files. The files are quality-checked by forum leaders in such areas as business, communications, desktop publishing, user groups, and utilities, among others. Compression and decompression programs are included with the America Online software, which costs $5.95 a month and hourly rates of $5 evenings and weekends, $10 weekdays. *Quantum Computer Services, Inc., 8619 Westwood Center Dr., Vienna, VA, 22182; (800) 227-6364.*

AMERICA Online

CIRCLE NUMBER 160

ASK NIBBLE *continued from page 9*

Table 1: PIN Values

Position	Value	Meaning	Purpose
1	1	Printer	Mode of serial port
	2	Communications	
2	1	6 data bits, 1 stop bit	Serial data protocol
	2	6 data bits, 2 stop bits	
	3	7 data bits, 1 stop bit	
	4	7 data bits, 2 stop bits	
	5	8 data bits, 1 stop bit	
	6	8 data bits, 2 stop bits	
3	1	110 (bits per second)	Baud rate
	2	300	
	3	1200	
	4	2400	
	5	4800	
	6	9600	
	7	19200	
4	1	None	Parity setting
	2	Even	
	3	Odd	
	4	Mark	
	5	Space	
5	1	No screen echo	Screen echo control
	2	Screen echo	
6	1	No LF after CR	Line feed after Return?
	2	LF after CR	
7	1	No CR	Return after "x" characters
	2	CR after 40 chars.	
	3	CR after 72	
	4	CR after 80	
	5	CR after 132	

These commands are usually done by printing a Control-I character followed by a value and a modifier character. For example, to set the baud rate to 9600 baud, a BASIC program would use the line:

```
PRINT CHR$(9);"14B"
```

"14" is the control value for the Control-I-*x*-B command for the Super Serial Card or Apple IIc (or IIGS) serial port. The space allotted for this column is insufficient for a complete listing of serial port commands, but the information you need is in the manual for the Super Serial Card and in the reference manuals for the Apple IIe, IIc, or IIGS.

Coming Soon!

► **Virtual Memory** — Your Applesoft arrays can now be as large as your disk media! This machine-language utility will store and retrieve large arrays from a disk in small portions as they are needed by your program.

► **Disk Encrypter** — Keep unwanted eyes from viewing your disks by encoding the entire disk. Only you will know the password to decipher them.

► **Pawns** — Practice your chess strategy as you face off against the Apple in a race of pawns on the Hi-Res screen.

Send In Your Entries!!!!

The One-Liner and Two-Liner Contests are ongoing events with several winners chosen every month! If you're one of the lucky winners, you can choose your favorite Nibble disk as your prize... just for having fun on your own. All you need to do is create the most interesting, attractive, useful, and/or clever program that can be typed using just one or two program lines.

Since this issue of *Nibble* will be hitting the newsstands so close to the Fourth of July, it seemed only fitting that a Hi-Res display of fireworks should win a prize. Just type in this two-liner, run it and watch as the fireworks explode on your monitor. For Fireworks, Ben Houston of Delta, BC, Canada will be receiving the Nibble disk Super Works.

```
4D | 1  DIM X1(405): HGR2 : FOR A
       = 1 TO 9E9: RESTORE :B
       = 0:H =  RND (1) * 179
       + 50:V =  RND (1) * 89
       + 20: FOR I = 1 TO 3:
       READ A(I),C(I),D(I),E(I
       ):Y(I) = 0: NEXT : FOR G
       = 0 TO 32 STEP .5: FOR
       I = 1 TO 3:A(I) = A(I) +
        .0005: HCOLOR= 3:X = C(
       I) * (1 +  SIN ((A(I) -
       75) / A(I))):Y(I) = Y(I)
       + D(I):S% = 189 - X - (
       V - E(I))
E2 | 2  HPLOT H + Y(I),S%: HPLOT
       H - Y(I),S%:X1(B) = Y(I)
       :B = B + 1:X1(B) = S%:B
       = B + 1: NEXT I,G:R = 8
       : FOR C = 1 TO 3: FOR I
       = 0 TO 400 STEP R:
       HCOLOR= 0: HPLOT H - X1
       (I),X1(I + 1): HPLOT H +
        X1(I),X1(I + 1): NEXT :
       R = R / 2: NEXT C,A: DAT
       A 1.1,32,.25,14,.998,28,
       .5,6,1.0815,28,.5,

TOTAL: 3131
```

So the award shows are over for another year. We now know who the best actor, actress, movie, singer, etc. were for 1989. If you're like most of us, you were not fortunate enough to get your name up in lights. Curt Esser of Crystal Lake, IL, has a solution. MARQUEES is a two-liner that puts your name, or any other message, up in lights on the Apple screen.

When MARQUEES is run, a question mark will appear on the screen. At this prompt, enter the number of lines of text contained in your message (1-10). The program will then prompt you, with a question mark, for each line of your message. Each line of the message can be no more than 37 characters long. After the last line of the message is entered, the marquee is lit and your name or message will appear in lights for all to see.

```
BC | 1 S = 38: INPUT N: FOR I = 1
       TO N: INPUT A$(I): NEXT
        :V = 10 - N: HOME :
       INVERSE : VTAB V + 2:
       FOR I = 1 TO N * 2 + 1:
       HTAB 4: FOR F = 1 TO 33
       : PRINT " ";: NEXT :
       PRINT : NEXT : VTAB V +
        3: FOR I = 1 TO N:H = 2
       1 -  LEN (A$(I)) / 2:
       HTAB H: PRINT A$(I):
       PRINT : NEXT : NORMAL :
       FOR F = 1 TO 50: VTAB V
       : PRINT "  ";: FOR I = 1
       TO 18: PRINT "* ";: NEX
       T : PRINT : FOR I = 1 TO
        N + 1
DC | 2  PRINT "*";: HTAB 39: PRIN
       T "*": PRINT " ";: HTAB
       39: PRINT " ": NEXT :
       PRINT "*";: HTAB 39:
       PRINT "*": FOR I = 1 TO
        19: PRINT " *";: NEXT :
       PRINT " ": VTAB V: FOR
       I = 1 TO 19: PRINT " *";
       : NEXT : PRINT " ": FOR
       I = 1 TO N + 1: PRINT "
       ";: HTAB 39: PRINT " ":
       PRINT "*";: HTAB 39:
       PRINT "*": NEXT : PRINT
        " ";: HTAB 39: PRINT "
       ": FOR I = 1 TO 20: PRIN
       T "* ";: NEXT : NEXT

TOTAL: 3131
```

If you like to peek around in the Apple's memory, give ADDRESS.PEEKER, by Richard McMillan of Commerce, GA, a try. When this one-liner is run, you will be prompted for the beginning and ending memory locations that you would like displayed. Be sure to enter these locations in decimal format. After this information is entered, the decimal and hexadecimal value of the first memory location will be displayed on the screen. Each subsequent keypress will display the contents of another memory location. ADDRESS.PEEKER is ProDOS and DOS 3.3 compatible.

```
45 | 1  HOME : PRINT  CHR$ (21);:
       H$ = "0123456789ABCDEF":
       INPUT "START ADDRESS: "
       ;S: INPUT "END ADDRESS:
       ";E: FOR I = S TO E:L =
       PEEK (I):L$ =  STR$ (L)
       :B =  INT (L / 16):B$ =
       MID$ (H$,B + 1,1):C$ =
       MID$ (H$, INT (L - 16 *
        B + 1),1): PRINT I" = "
       TAB( 12 -  LEN (L$))L$"
        = $"B$C$: GET A$: NEXT

TOTAL: 0001
```

Typing These Programs ★ ★ ★ ★ ★ ★

Here are a few tips for typing in one-liners and two-liners. Be sure to omit spaces when typing in Applesoft programs, unless the spaces appear in strings between quotes, or in REM or DATA statements. You'll find it easier (and often essential) to substitute the question mark (?) for the PRINT statement. And when typing in machine language programs, it's safe to type in just the second digit of a hexadecimal pair if the first digit is a zero, e.g., the hex pair 03 can be typed in simply as 3. For more information on typing in programs, see the Typing Tips section.

The Ground Rules ★ ★ ★ ★ ★ ★ ★ ★

Your programs must be your own, original work and may be written in Applesoft or machine language. You must be able to enter your program directly from the keyboard, without using a programming aid or line editor. Programs must be submitted on disk, accompanied by an 8.5- x 11-inch sheet of paper with your name, address, Nibble disk choice, program instructions and the words "One-Liner Contest" or "Two-Liner Contest."

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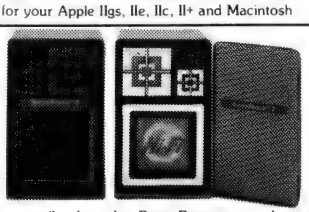

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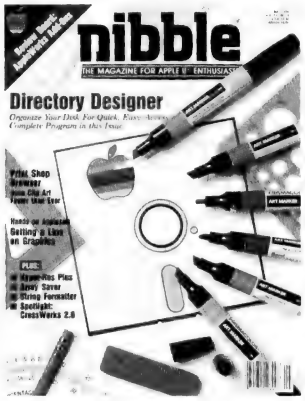

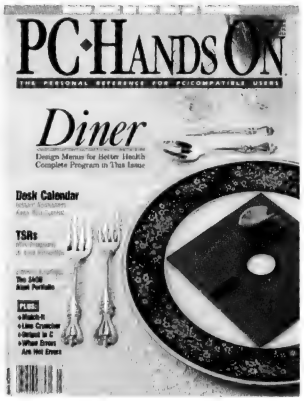

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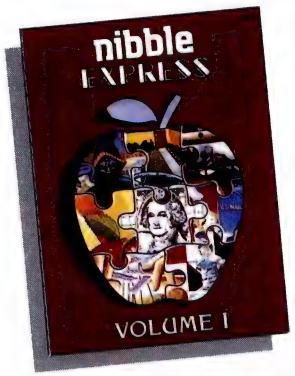

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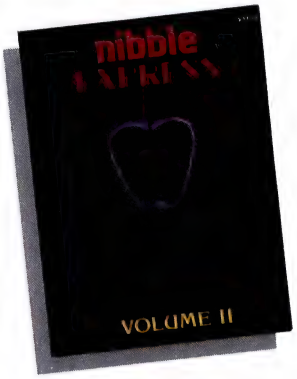

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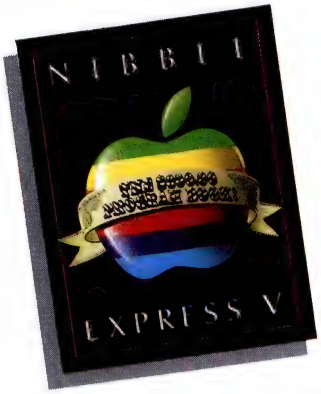

Highlights: **Nibble File Cabinet** is an easy-to-use database filing system with record lengths you can set yourself. **Applesoft Global Editor** is a powerful editor for Applesoft programs, with an automatic search-and-replace option. **Sound Synthesizer** plays simple melodies and displays the notes on the Hi-Res screen. **Hi-Res Houdini** lets you create magical graphics effects. Also:

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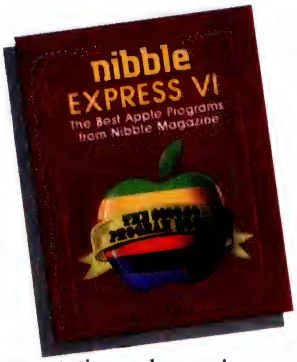

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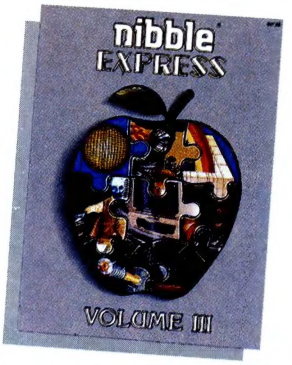

Highlights: **Income TRAC** monitors your income from various sources. **Apple MLE** lets you enter and edit machine language programs with ease. **Micro-Calc** generates customized finance programs for your home or business. **Applesoft Line Editor** streamlines the process of writing and editing Applesoft programs. Also:

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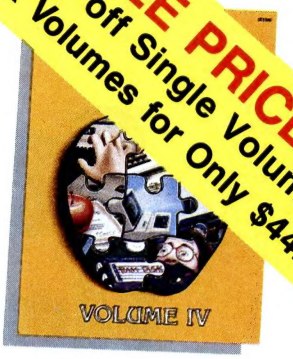

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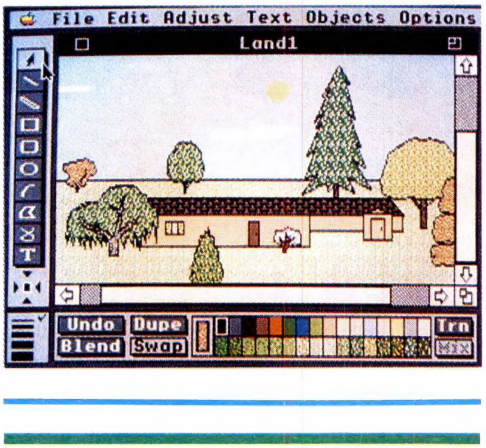

Landscape for the IIGS, also available for the IIe and IIc, lets you draw a basic outline of your house, and then select plantings to put around it. Working in a top view of your house and land, you place the plantings you want from a selection of 28 trees and 17 shrubs. You can add objects to your house and yard, such as picture windows and a storage shed.

Once your basic trees, shrubs, and objects are placed using the mouse and standard cut, paste, and move procedures, you can view them from any of four sides. This gives you the perspective of approaching the house from any direction. In these views, and the top view, you can select any or all of the foliage and adjust their age using the mouse and a scroll bar. You may find that a tree is too overpowering for the view you want from the street, or that it would shade the house too much.

There are limitations to the detail you can attain with this portion of the the program. For instance, you can't draw a driveway or sidewalk in the top view, nor can you add ground covers or grasses. For adding these details, you need to use the Finishing Tools. You can add any type of object, and additional views are included for the sheds, fences, and windows. A color monitor makes this feature a lot of fun, as you have a lot of options for palettes and patterns. Text can also be added with the finishing tools.

If you still want to jazz up your landscape plan more, a separate Paint Your Own Home program provides a fairly complete draw program, complete with a small clip art library of trees, sports, architectural shapes, and miscellaneous items. When you're finished, you can print your design on an ImageWriter or LaserWriter. And if you have the program add numbers to the trees and shrubs, you can have it print out a shopping list!

Additional clip art files of trees and shrubs are available for the South, East, Southwest, and Northwest regions of the U.S. These are paint-layer disks that are more realistic than the object-layer plants.

If you need ideas for planning your landscape, 24 sample plans are included with the package, and you can order an additional disk of 48 drawings. These are all variations on the themes contemporary, traditional, colonial, Spanish, Victorian, and Saratoga.

Landscape is a fun program to use, and indispensable if you are toying with various designs for the greening of your yard. Its 80-page manual has an extensive table of contents that makes up, for the most part, for the lack of an index.

Landscape complements the two other Abracadata programs in the Design Your Own Home series: Architecture and Interiors. Landscape for the IIGS comes on two 3.5-inch disks and costs $89.95. The IIe, IIc, and IIc Plus version comes on 5.25-inch disks and costs $69.95. Supplemental disks cost $29.95. Contact Abracadata at P.O. Box 2440, Eugene, OR 97402; (503) 342-3030.

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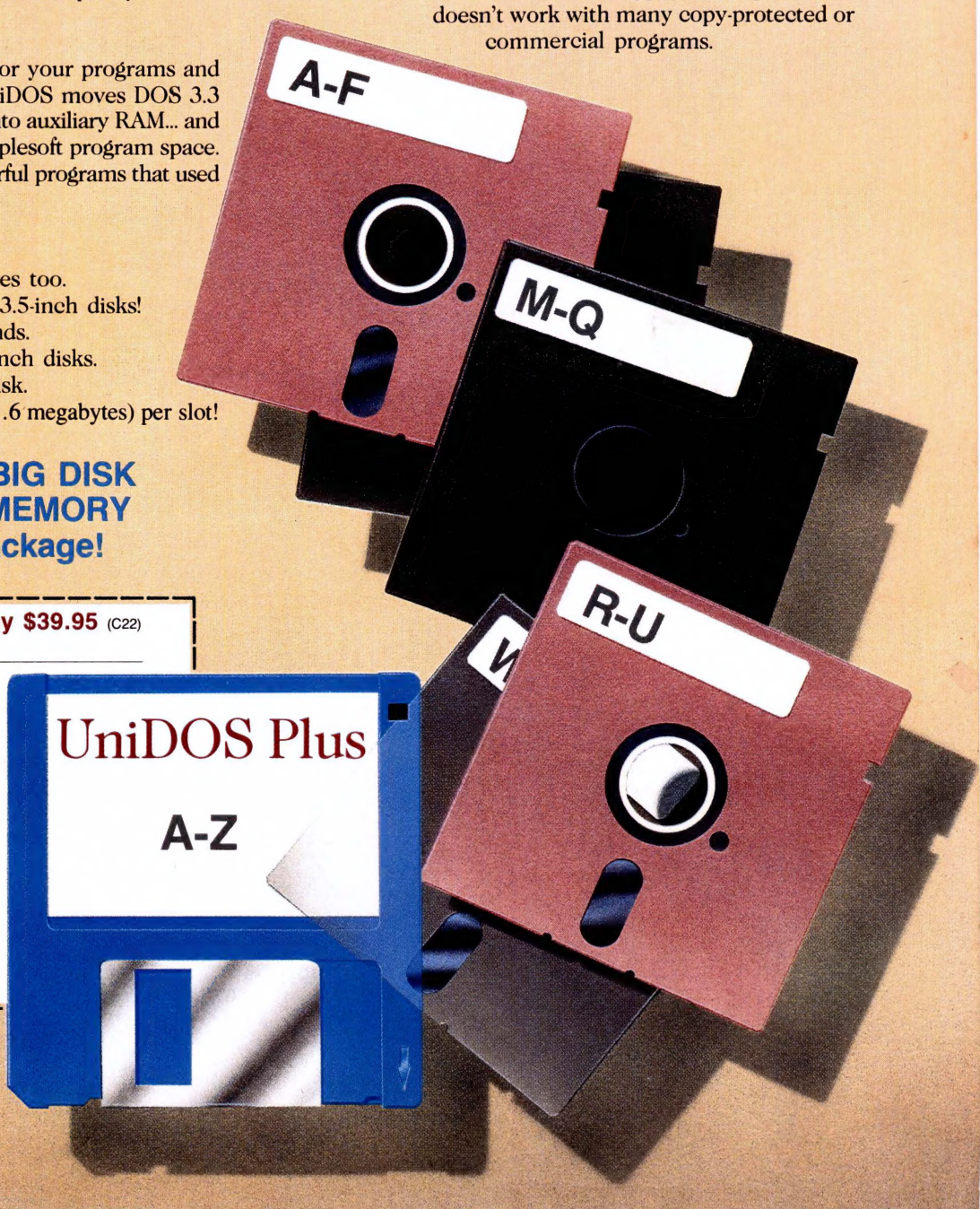

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